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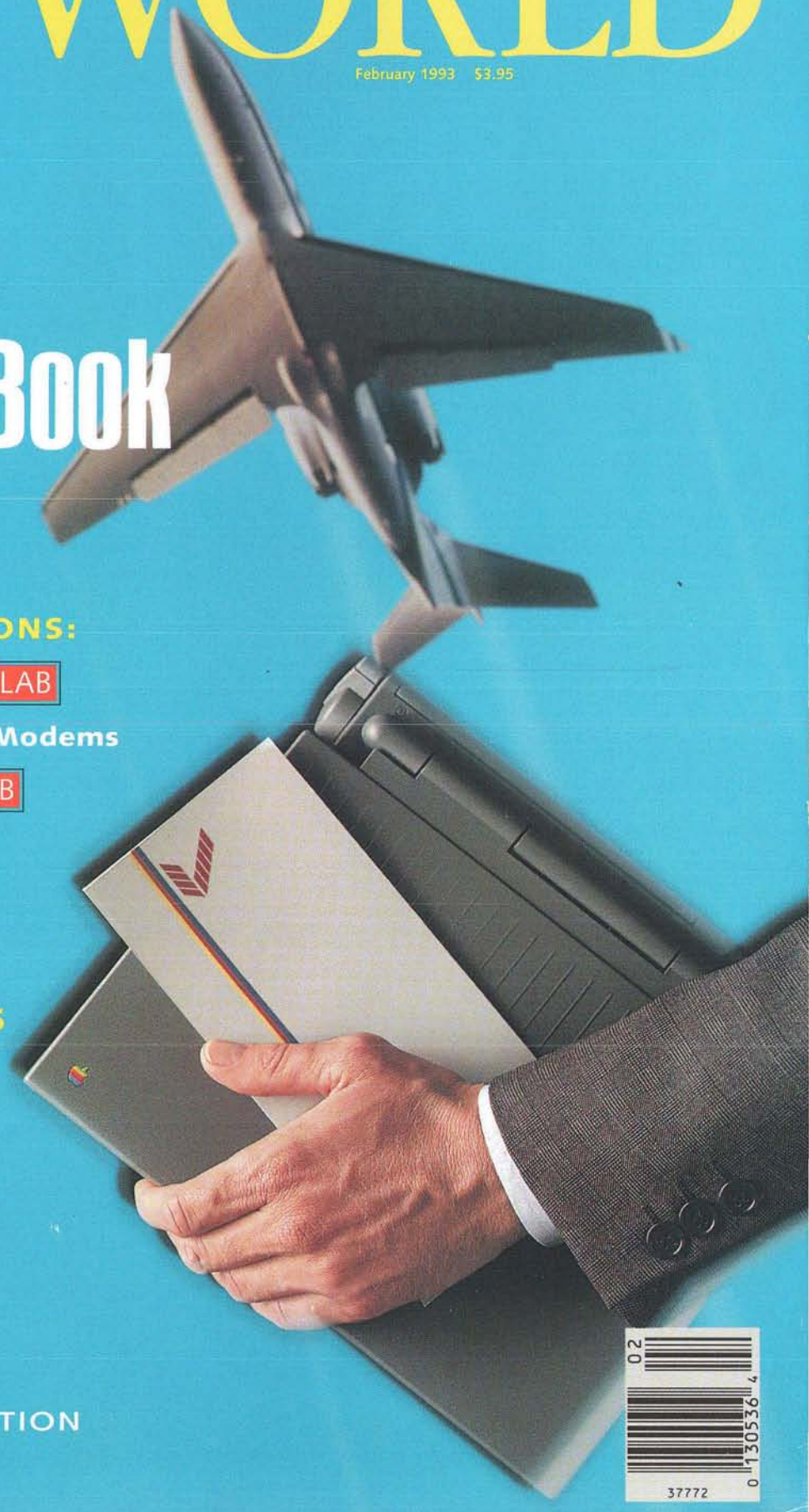

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Full Color Fast!

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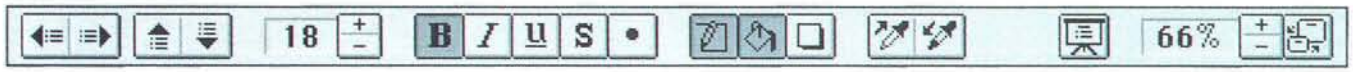

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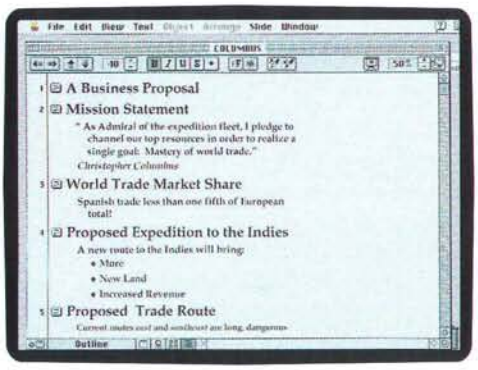

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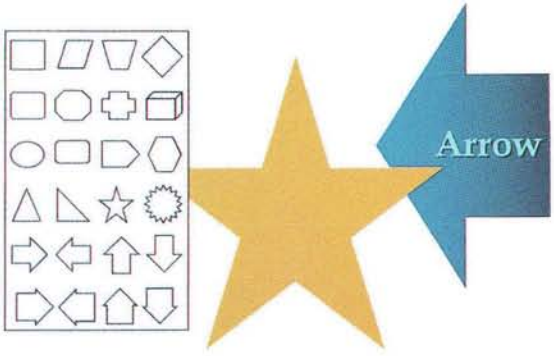

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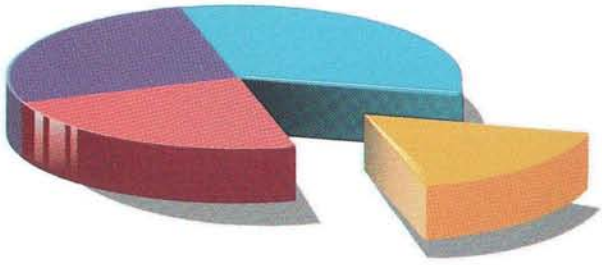

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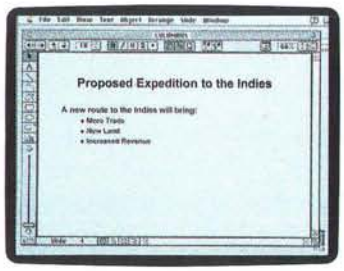

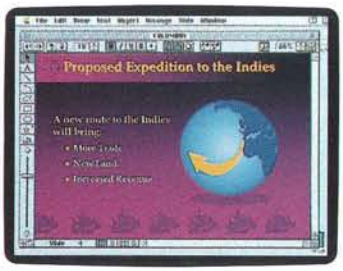

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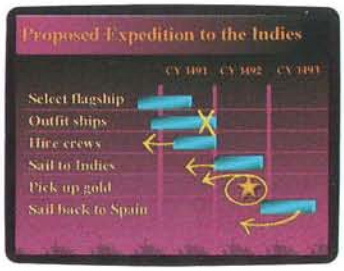

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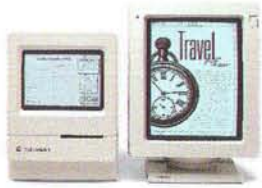

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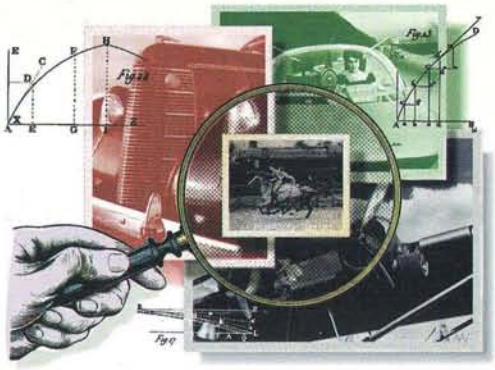

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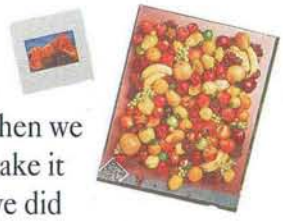

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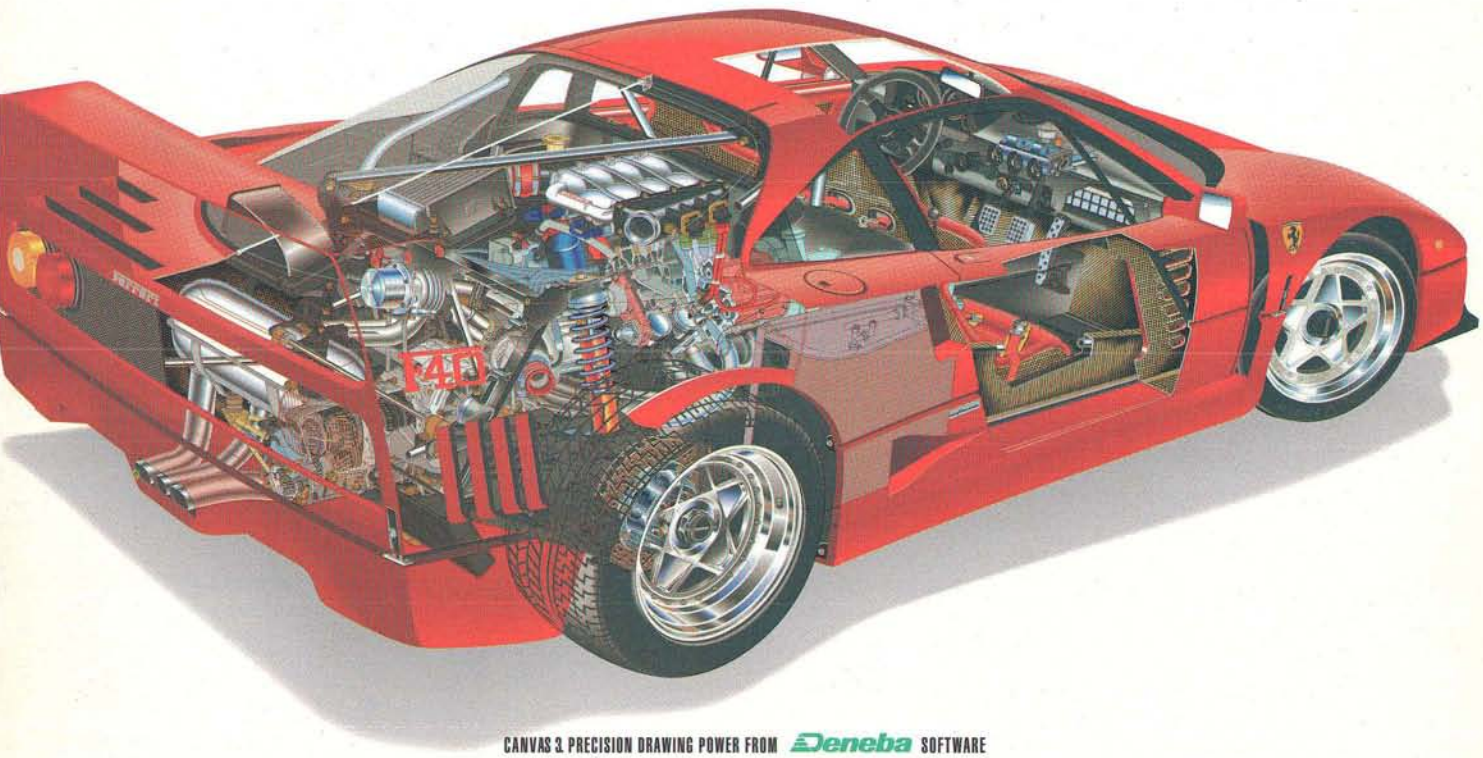

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We're also offering a $100 rebate on the HP ScanJet IIc color scanner. With its superior scanning capabilities, it meets all your imaging and text needs.

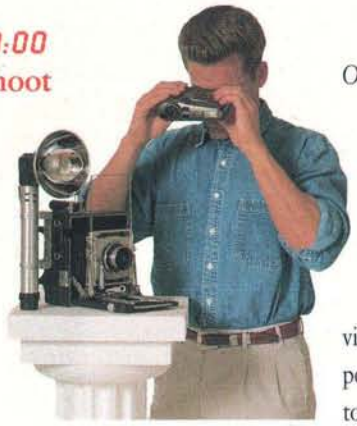
HP DeskWriters and ScanJets won landslide victories in Macworld magazine's World-Class Awards.* Voted on by Macintosh enthusiasts who subscribe to Macworld.

So call **1-800-35HPMAC,** Ext. 7037 for more details and the name of your local authorized HP dealer. You'll find that the price of fame is very reasonable.

HEWLETT PACKARD

Painless Presentations

10:00
Shoot



Ouch!...Film. Processing. Projectors. Trays. Bulbs. All things that can make preparing a presentation a painful experience. The *Canon RC-570 Still Video Camera* can change all that. It records 25 electronic photos on a reusable 2-inch video floppy disk. No film or processing. No waiting. No waste. The 3X zoom lens and 450-line frame video resolution ensure superior image quality. Speed, portability and ease of use make the RC-570 an ideal tool for creating and delivering presentations.

10:12
Process

Canon's *RC-570 Electronic Still Presentation System* integrates the electronic photos as a computer graphic file into software, like Persuasion®, allowing you to produce image enhanced presentations quickly and easily. Once the "electronic slides" are complete, record the entire presentation to a video floppy disk. Imagine 25 slides on a single, reusable 2-inch disk, immediately, with no processing!

10:45
Present

Connect the RC-570 camera to any standard TV-monitor or video projector to deliver impressive presentations directly from your video floppy disk. Edit presentations right on the spot, add a shot, delete a shot, rearrange and customize. No computers. No slides. No projectors. No hassles.

Now...doesn't that feel better.

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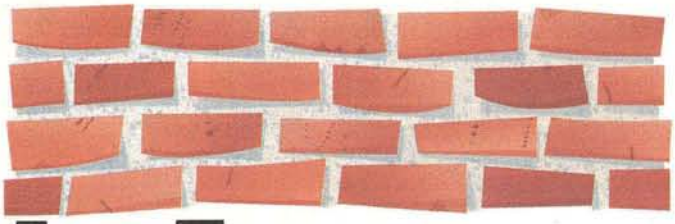

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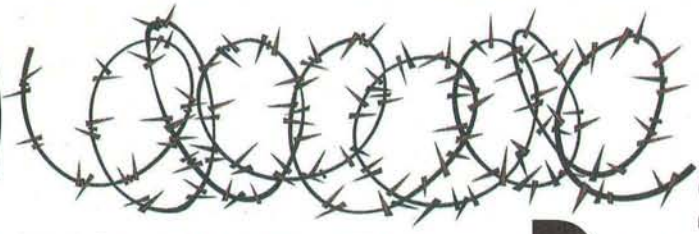

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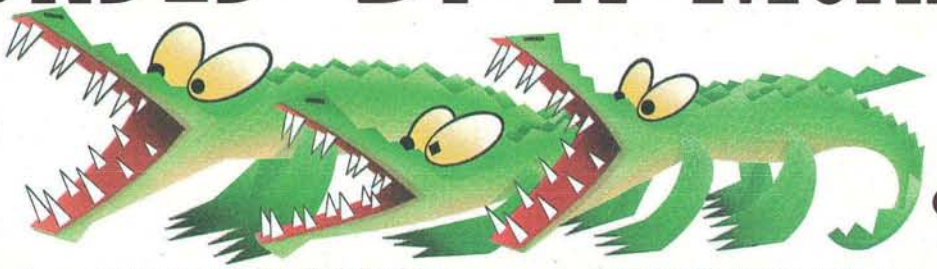

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WITHOUT BECOMING ONE OF THOSE OBNOXIOUS PEOPLE WHO ARE NEAT, PRECISE AND ORGANIZED.

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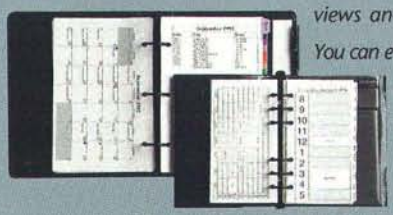

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STEP 6. FLY TO ZIMBABWE. OKAY, NOW BRING UP YOUR CALENDAR ON YOUR POWERBOOK. GOOD. NOW COMPLETELY DISCOMBOBULATE THE THING. CHANGE IT ALL AROUND. GREAT. NOW CONNECT TO YOUR OFFICE VIA MODEM. PRESTO! ALL YOUR CALENDARS AUTOMATICALLY UPDATE THEMSELVES.

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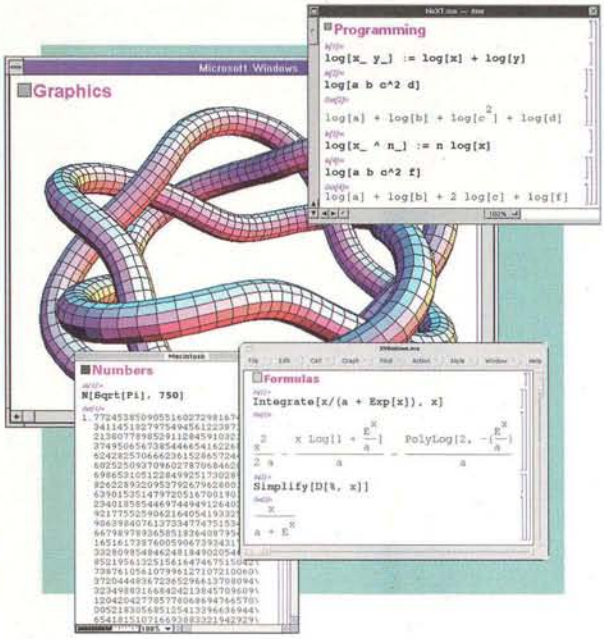

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FIFTH GENERATION SYSTEMS, INC

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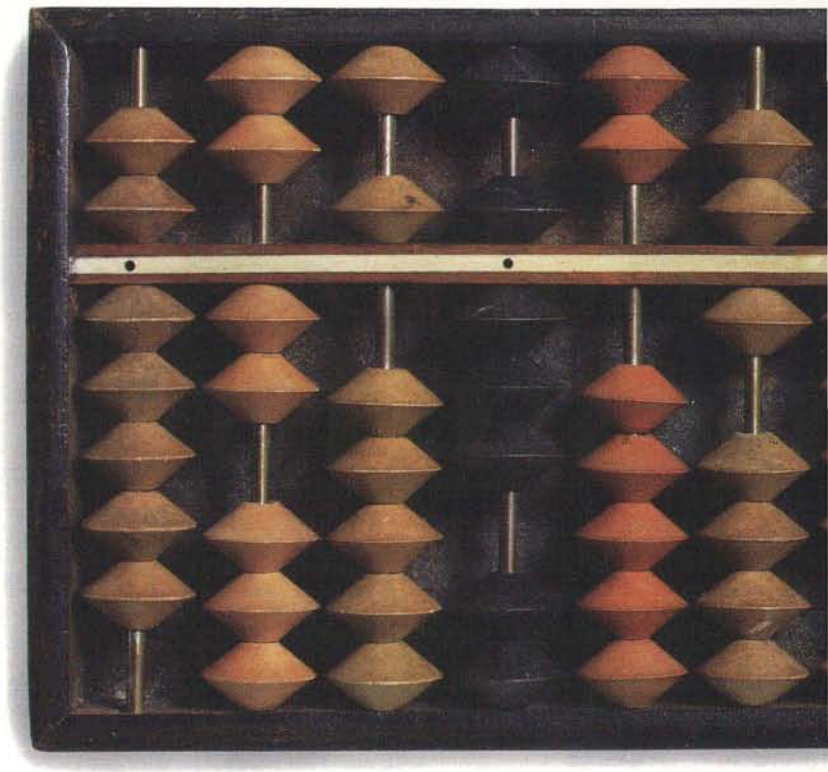
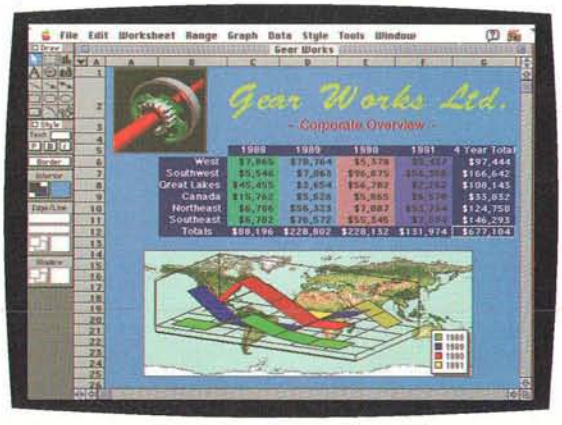
It's been centuri with number

The abacus first appeared around 500 or 600 B.C. Some say it was invented by the Egyptians. Others think it was the ancient Chinese. But whoever it was, they had the right idea: create a simple, easy-to-use device for working with numbers, and people will be a lot more productive.



Introducing 1-2-3 for Macintosh Release 1.1: the easiest-to-use Mac® spreadsheet.

Like the abacus, 1-2-3® for Macintosh® was inspired by simplicity, and Release 1.1 is even simpler to use. Now you can drag-and-drop data between worksheets. And with new SmartSum, you can simultaneously sum multiple ranges. Plus, Copy Down, Copy Right and Copy Back enable you to copy labels or formulas across columns, rows or 3D worksheets.



New graphing enhancements in Release 1.1 let you turn your numbers into graphic presentations faster and easier than ever.

Of course, 1-2-3 is still the only spreadsheet tha gives you In-Cell™ editing, so you can enter a formula directly into a cell for faster, easier editing.

The easiest graphing of any Mac spreadsheet

1-2-3's remarkable graphing and charting capabilities make it the best Macintosh spreadsheet for presenting data. Because unlike Microsoft® Excel, 1-2-3 lets you store your graphs and charts in the same file as your worksheets. So you can manipulate data, text and graphics all in the same file with *one* set of menus and only *one* set of tools. And you can make one-click graph type changes, pull objects across window boundaries to the

The QuickTime animation "Magical Gear" was created

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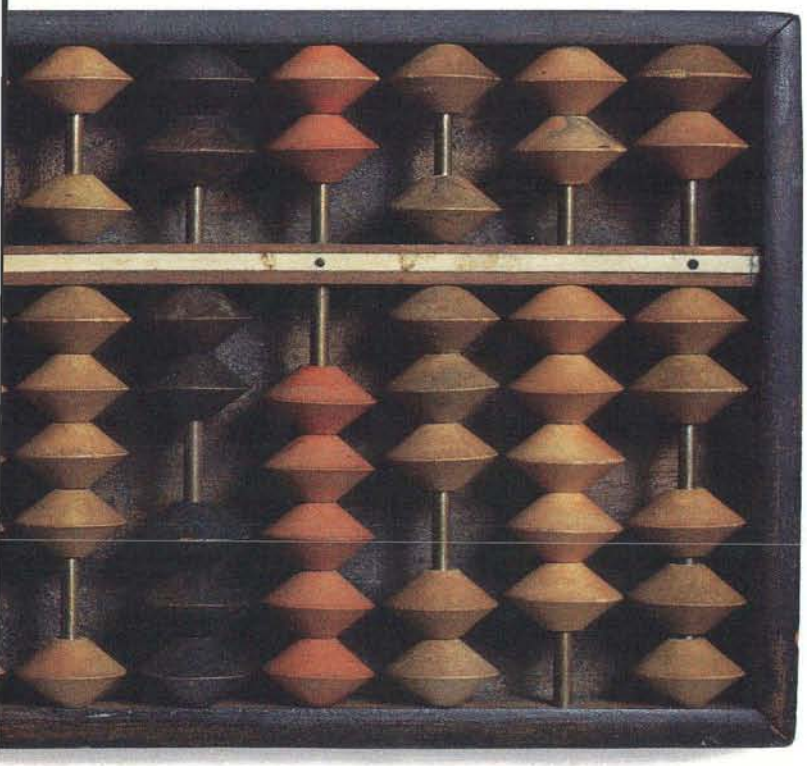


True 3D makes organizing and analyzing data fast and easy.

Only with the true 3D capabilities of 1-2-3 can you easily consolidate multiple spreadsheets into *one* file without having to link the files. 3D allows all spreadsheet functions to be performed *through* multiple worksheets just as they are performed down rows and across columns.

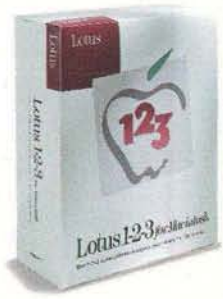
The easiest transition from DOS to Mac.

For DOS spreadsheet users moving to Macintosh, 1-2-3 is the only way to go. 1-2-3's traditional Classic® Menu makes it easier for you to access familiar 1-2-3 commands and to run macros already written for 1-2-3. And only 1-2-3 offers cross-platform capabilities, so you can work more efficiently and productively with the 18 million other 1-2-3 users across all major platforms.

worksheet, dynamically link chart titles to cell contents, and shrink charts so they appear as small icons on your worksheet.

Now Release 1.1 takes these graphing capabilities even further. Like the ability to paste pictures behind your graphs, stack pictures to form bar charts, and view your graph source data by scrolling up the bottom edge of your graph. You can even resize chart text simply by using the mouse to drag the handles.

1-2-3 for Macintosh. All in all, it's the easiest way to work with numbers to come along in centuries. To find out for yourself, buy a copy from your Lotus Authorized Reseller,* and try it for 60 days with a full money-back guarantee direct from Lotus.® Or call **1-800-TRADEUP, ext. 7312**** for a free working model. (Excel users be sure to ask about our special upgrade price.***)



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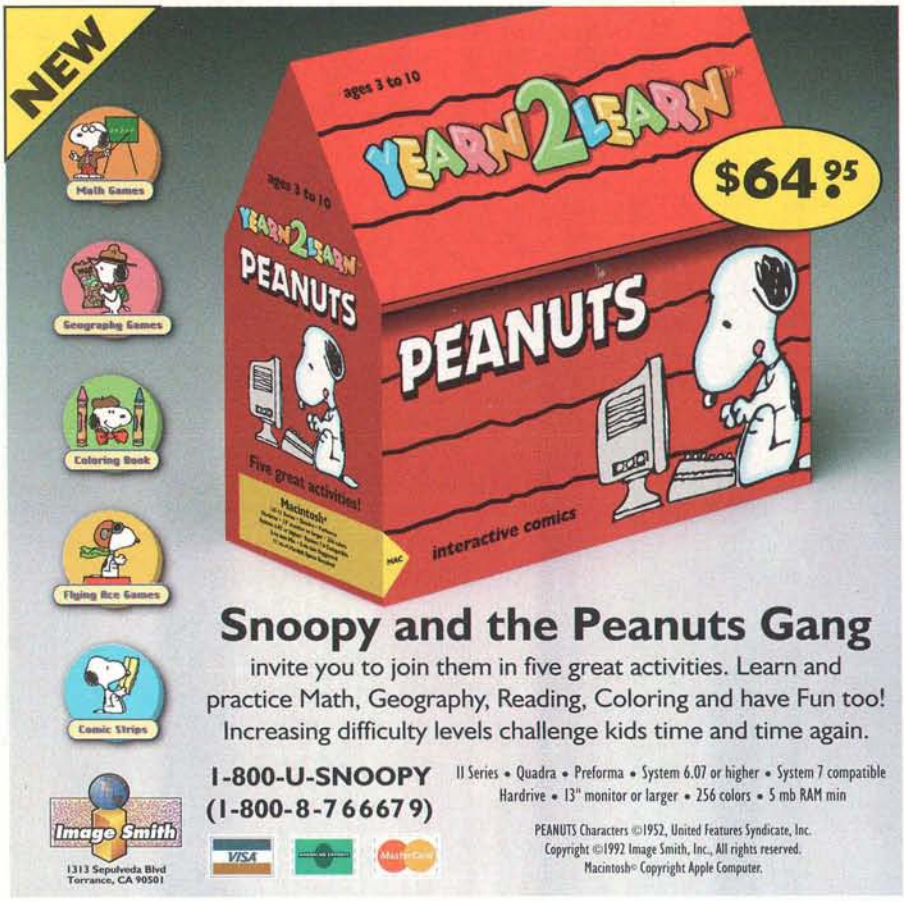

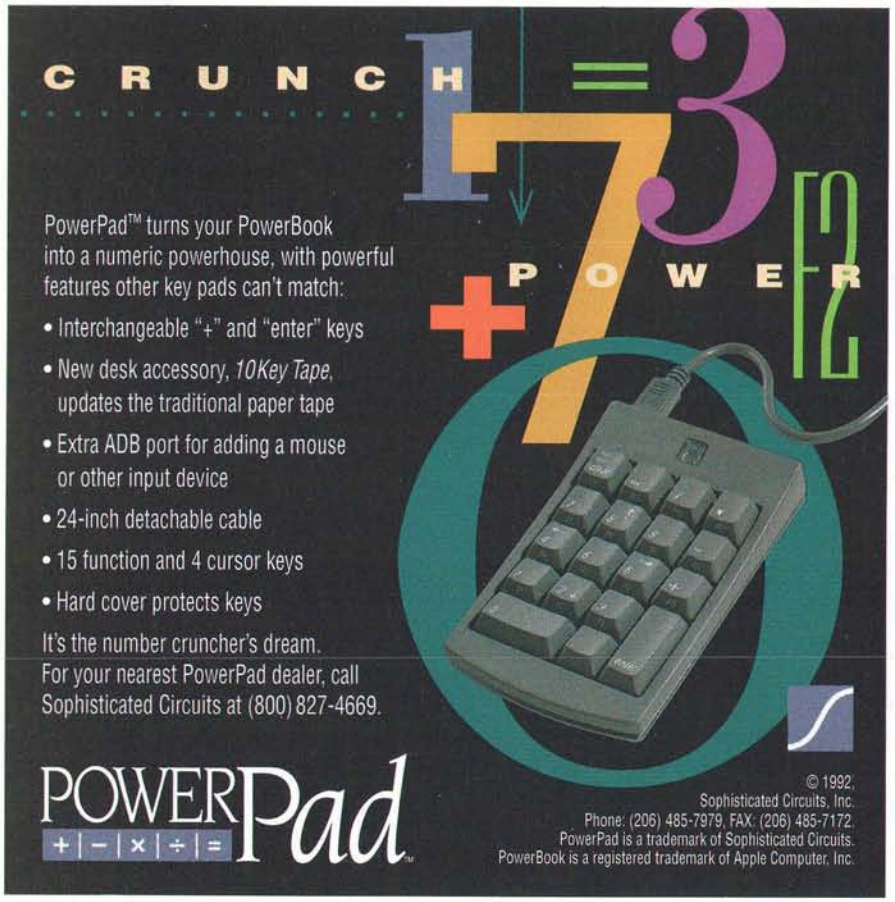

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Circle 1 on reader service card

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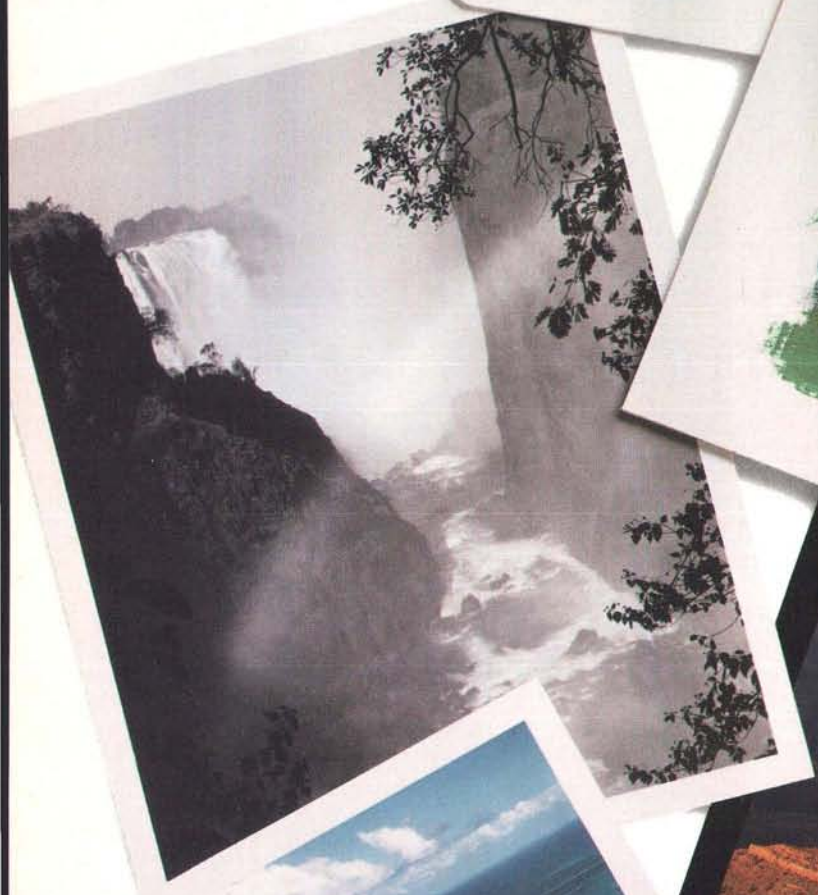

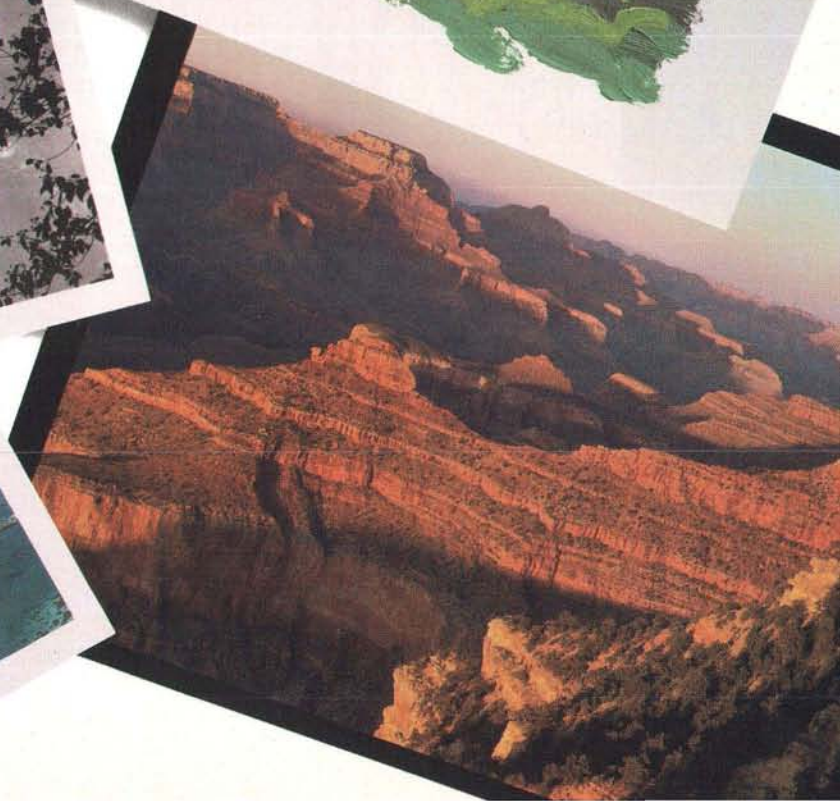

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MacBulletin

LATE-BREAKING NEWS

PowerBook 180 Slow Shipping: Apple confirmed that the PowerBook 180 is shipping only in limited quantities because the LCD maker has failed to deliver enough displays. However, an Apple representative said shipments of the laptop are increasing every week. Another Apple employee said that the screen vendor was in violation of its contract with Apple. Both said the 180 was not in danger of being discontinued.

Prison for Software Pirates: The federal government recently passed legislation making copying software for commercial purposes a felony punishable by five years in prison or a $250,000 fine. The legislation only affects organizations that use pirated software internally or resell it.

Adobe's New ATM: Adobe (415/961-4400) is developing SuperATM, a version of its font-rendering utility, Adobe Type Manager, that will intelligently substitute fonts and maintain page layout when a document is moved to a machine that lacks the right fonts. The $149 SuperATM will include two Multiple Master fonts, several other typefaces, and a version of Adobe Type Reunion that indicates which fonts are substitutes.

Apple Bundles E-Machines Board: As a special promotion, Apple is offering the Apple 16" Color Display bundled with E-Machines' DoubleColor SX graphics adapter for $1799. The 256-color adapter will be available with the monitor through April 18. Contact your Apple reseller.

Apple Support for the Deaf: Apple has upgraded its Customer Assistance Center phone system with Telecommunications Device for the Deaf (TDD) software so that deaf and hearing-impaired people can access sales information and general customer information. The 24-hour Customer Assistance Center number is 800/833-6223.

88MB SyQuest Drive: In January SyQuest Technology plans to announce at Macworld Expo, and start shipping, an 88MB removable-cartridge drive that can read from and write to the huge number of existing 45MB SyQuest cartridges. The current 88MB SyQuest drive can read 45MB cartridges but can't write to them. The drive, called the SQ5110C, will be available through third-party vendors at prices to be set by those vendors.

Connecting Ethernets: Compatible Systems (303/444-9532) is shipping a RISC-based gateway and router for connecting and moving packets between Ethernets running AppleTalk, TCP/IP, or DECnet. The RISC Router 3000E lists for $2995. Future plans call for IPX support as well.

Compressed Color: Storm Technology (415/691-6600) is upgrading its JPEG-based color image-compression program PicturePress to version 2.5 with a faster engine and support for UserLand's Frontier scripting system. PicturePress comes with several scripts, including one for automating batch jobs. It lists for $199, or $999 with Storm's PhotoFlash accelerator board.

Type Solutions Goes Pro: Incubator Pro adds support for Type 1 PostScript to its TrueType support, converts between formats, and offers three new editing controls: x-height, descender size, and tracking. $129 from Type Solutions, 603/382-6400. m

When the mercury

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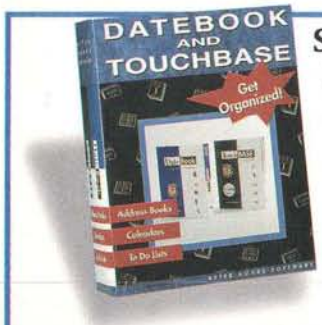

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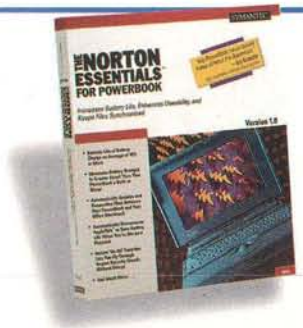

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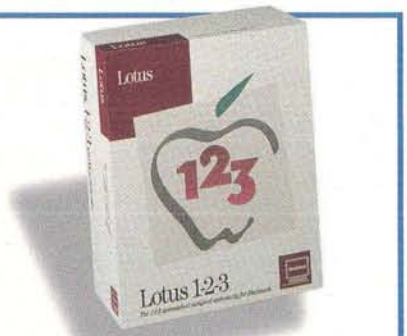

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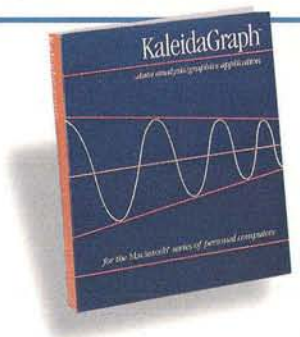

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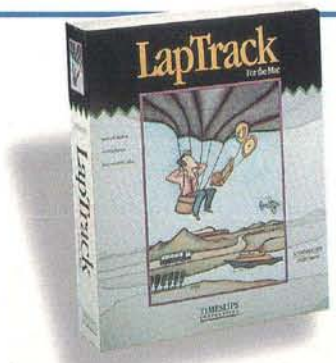

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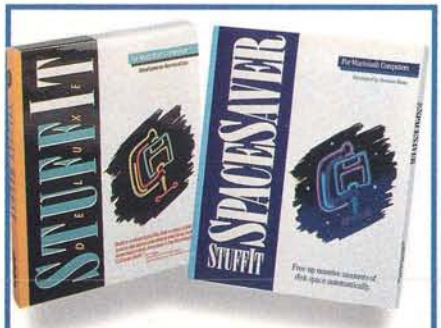
★Aldus ... 30 day MBG
6674 ❼Aldus Personal Press 2.0 ..... 99.
2461 ❼Aldus Gallery Effects 1.01 ..... 128.
10176 ❼Fetch or 7541 ❼IntelliDraw..... *ea.* 199.
3506 ❼SuperPaint 99. 4751 ❼Persuasion. 325.
1330 ❼FreeHand 394. 7088 ❼PageMaker 494.
Altsys
1983 ❼EPS Exchange 2.0 ..... 89.
1195 ❼Fontographer 3.5 ..... 258.
★Apple Computer ... 30 day MBG
3008 ❼Apple Font Pack ..... 79.
★Ares Software ... 30 day MBG
8878 ❼FontMonger 1.5 *(Dec. '92)*..... 93.
Broderbund Software
7293 ❼Kid Pix Companion..... 23.
3572 ❼Kid Pix 1.2..... 34.
1427 ❼Print Shop..... 35.
6281 ❼TypeStyler 2.1 *(with ATM)*..... 126.
★Claris ... 30 day MBG
2518 ❼MacDraw Pro 275. 7505 ❼Upgrade 95.
8007 ❼Claris CAD 2.0 599. 6943 ❼Upgrade 79.
ColorAge (formerly Custom Applications)
8037 ❼Freedom of Press Light 3.03 *(17 fonts)*. 84.
Computer Associates
9581 ❼Cricket Draw III 1.0..... 159.
★DeltaPoint ... 60 day MBG
3558 ❼DeltaGraph Pro 2.0..... 199.
★Deneba Software ... 30 day MBG
3227 ❼Canvas 3.0.4 ..... 259.



★Aladdin Systems ... 30 day MBG

6740 ❼*StuffIt Deluxe 3.0*—Compression solution solves all your needs from archiving to transparent compression..... **$65.**

7410 ❼*StuffIt SpaceSaver 1.0*—Increases disk space without changing the way you work **34.**

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Gryphon
4202 ❼Morph 1.0 ..... 95.
★Letraset ... 30 day MBG
4709 ❼LetraStudio 139. 6300 ❼FontStudio 359.
Light Source
3733 ❼Ofoto 1.1.1 ..... 275.
★Linguist's Software ... 60 day MBG
2569 ❼Cyrillic II 99. 2641 ❼Laser Hebrew.. 89.
Macromedia
7651 ❼Action! Mac 349. 7441 ❼SwivelPro... 479.
3450 ❼SwivelMan 596. 7653 ❼MacroModel 999.
Manhattan Graphics
4990 ❼Ready,Set,Go! *(special 'til 1/31/93)*.. 149.
★MicroMaps ... 30 day MBG
7556 ❼MapArt *(PICT)* or 7555 *(EPS)*..... *ea.* 89.
★Microsoft ... 30 day MBG
2878 ❼PowerPoint 3.0 295. Upgrade..... call
2565 ❼Project 3.0..... 445. Upgrades ..... call
Postcraft International
2210 ❼Effects Specialist 2.0 ..... 89.
Quark
7612 ❼QuarkXPress 3.2 *(Dec. '92)*..... 549.

★Specular International ... 30 day MBG

4962 ❼*Infini-D 2.0*—Blistering rendering speeds, QuickTime, & incredible texture mapping let you create broadcast-quality images & animations!..... **$699.**

3543 ❼*Replicas #1*—3D clip objects ..... **135.**

★Specular International ... 30 day MBG
4962 ❼Infini-D 2.0 699. 3543 Replicas #1 135.
Synergy Software
6617 ❼ KaleidaGraph 2.1.3 ..... 149.
★Timeworks ... 30 day MBG
7115 ❼Publish It! *Easy* 3.0..... 109.
7409 ❼Color●It! 2.0..... *special* 129.
★T/Maker ... 30 day MBG
❼ClickArt *(bitmapped)* 38. or *(EPS)*.... 82.
★Virtus Corporation ... 30 day MBG
4488 ❼WalkThrough 1.1 ..... 309.

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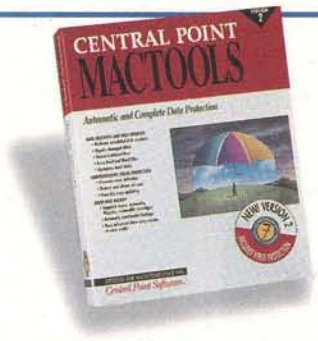
UTILITIES, HYPERCARD, SECURITY

★Abbott Systems ... 30 day MBG
2515 ❼Calc+ 1.0 36. 5236 ❼CanOpener 2.0 59.
★Aladdin Systems ... 30 day MBG
7410 ❼Stuffit Space Saver 34. 6740 Deluxe 3.0 65.
★Aldus ... 30 day MBG
5100 ❼SuperCard 1.6 ..... 195.
★ALSoft ... 30 day MBG
9808 ❼MasterJuggler 25 9807 ❼DiskExpress II 45.
5204 ❼ALSoft Power Utilities 1.0.2..... 62.
★Alysis Software ... 30 day MBG
2687 ❼SuperDisk! 49. 1608 ❼More Disk Space 42.



Central Point Software

5041 ❼*MacTools 2.0*—New Version offers automatic backup, data recovery and virus protection in an integrated package. *MacWEEK*, *Macworld* and *MacUser* claim it is a blockbuster product..... **$105.**

★Apple Computer ... 30 day MBG
1206 ❼At Ease 1.0 ..... 49.
1074 ❼System 7.1 79. 3413 ❼MultiPack... 349.
7072 ❼QuickTime Starter Kit 1.5 ..... 149.
★ASD Software ... 30 day MBG
7085 ❼FileGuard 2.7.2 *(1 user)* ..... 138.
★Atticus Software ... 60 day MBG
9120 ❼Super 7 Utilities ..... 64.
★Berkeley Systems ... 30 day MBG
2198 ❼More After Dark *(M.A.D.)*..... 23.
5737 ❼After Dark 2.0V 28. 2196 ❼Bundle... 39.
7987 ❼Art of Darkness *(Peachpit Press)*..... 16.
3392 ❼Star Trek: The Screen Saver..... 34.
★Casa Blanca Works ... 30 day MBG
1593 ❼Drive 7 2.3 ..... 49.
★CE Software ... 60 day MBG
1727 ❼CalendarMaker 31. 8024 QuicKeys^2.. 89.
★Central Point ... 30 day MBG
5041 ❼MacTools 2.0 ..... 105.
★Claris ... 30 day MBG
8734 ❼HyperCard Development Kit 2.1 ..... 139.
★Connectix ... 30 day MBG
8441 ❼CPU *(Connectix PowerBook Utilities)*... 49.
Coral Research
7310 ❼TimeLog.... 62. 7309 *(10 Pack)*..... 399.
★Dantz Development ... 30 day MBG
9115 ❼DiskFit Direct 1.0.... 29. 3393 ❼Pro.. 72.
5255 ❼Retrospect 147. 7945 ❼Remote 1.3 264.
7946 ❼Remote *(10 Pak)* 147. 3112 ❼*(50 Pak)* 639.
★Datawatch ... 30 day MBG
4803 ❼Virex/Mac or 8561 ❼911 Utilities..... 62.
★Fifth Generation ... 30 day MBG
4287 ❼PYRO! 4.01 27. 3955 ❼Suitcase 2.1 53.
8286 ❼SuperLaserSpool 3.0..... 99.
5178 ❼FastBack Plus or 5725 ❼DiskLock... 125.
7404 ❼DiskDoubler 52. 4838 AutoDoubler.. 58.
FWB, Inc.
10198 ❼CD ToolKit ..... 49.
7929 ❼Hard Disk ToolKit Personal Edition .... 49.
2999 ❼Hard Disk ToolKit 1.1.1..... 125.
ICOM Simulations
6296 ❼Intermission.. 29. 3731 ❼OnCue II.. 55.
★Inline Design ... 30 day MBG
1744 ❼Icon 7..... 31. 9843 ❼Inline Sync 1.0 79.
7068 ❼INITPicker 3.0..... 49.
2913 ❼Redux 1.63.... 49. 1740 Deluxe..... 92.
Insignia Solutions
7552 ❼Rapid Trak..... 56.
★Kent Marsh Ltd. ... 30 day MBG
9513 ❼FolderBolt 1.02 ..... 71.
★KyZen Corporation ... 30 day MBG
10173 ❼UP Diff 1.0 ..... 125.
★Leader Technologies ... 30 day MBG
10272 ❼PowerMerge ..... 75.

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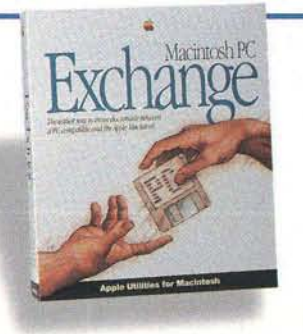
3732 ❼*MacEKG*—Provides in-depth knowledge on what makes your Mac tick. Features: advanced component-level diagnostics, log & compare 178 different parameters, ability to isolate/diagnose intermittent failures ..... **$89.**

★**Logical Solutions ... 30 day MBG**
10169 ❼7th Heaven ..... 67.
★**Magic Software ... 30 day MBG**
7267 ❼AutoSave II 26. 7270 ❼Backmatic.. 50.
★**MAXA Corporation ... 30 day MBG**
8692 ❼Snooper 2.0 HW & SW Kit *(Jan. '93)*.. 149.
8694 ❼Snooper *(software only)* ..... 119.
★**MicroMat Computer Sys. ... 30 day MBG**
3732 ❼MacEKG II 2.0.5 ..... 89.
★**Microspot ... 30 day MBG**
8706 ❼MacPalette II 45. 8752 MacPlot Pro 249.
★**Nine to Five Software ... 30 day MBG**
2020 ❼9 to 5 Office ..... *special* 19.
9767 ❼Reports 2.5 ..... 125.
★**Now Software ... 30 day MBG**
1793 ❼Now Up-To-Date... 65. 2366 *(10)*. 519.
6925 ❼Now Utilities 4.0.... 95. 8471 *(10)*. 775.
Palomar Software
8210 ❼PLOTTERgeist 2.1 ..... 249.
Pluma, Inc.
8704 ❼Cause or 8713 ❼Net Effect ..... *ea.* 185.



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7073 ❼*Macintosh PC Exchange*—Lets Mac computer users work with files stored on 3½" MS-DOS and Windows-formatted floppy disks. Move files between a Mac and a PC as easily as you can between two Macs..... **$69.**

★**Symantec ... 30 day MBG**
5176 ❼AntiVirus for Mac *(SAM)* 2.1 ..... $64.
6748 ❼Norton Utilities for Mac 2.0 ..... 95.
3421 ❼THINK Pascal 165. 2688 ❼THINK C 199.
9957 ❼THINK Reference 1.0 ..... 68.
Teknosys
5203 ❼Help! ..... 88.
★**TGS Systems ... 60 day MBG**
6667 ❼Prograph 2.5 ..... 299.
★**Thought I Could ... 30 day MBG**
4843 ❼Wallpaper 1.0.2 ..... 37.
UserLand Software
4753 ❼Frontier 2.0 ..... 185.
★**Utilitron, Inc. ... 30 day MBG**
9616 ❼Guaranteed Undelete w/TrashMaster 45.

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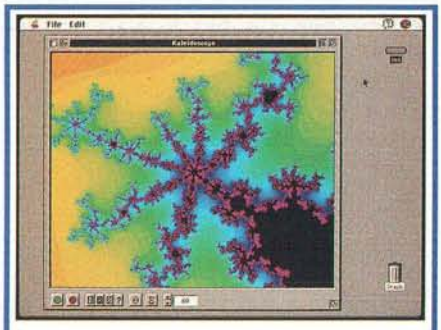
★**Abbott Systems ... 30 day MBG**
9578 ❼Kaleidoscope ..... 25.
Activision
1039 ❼Shanghai II ..... 29.
1134 ❼Lost Treasures of Infocom Vol. I..... 40.
2470 ❼Lost Treasures of Infocom Vol. II..... 29.
★**AMTEX Corporation ... 30 day MBG**
2517 ❼TRISTAN Pinball ..... 33.
★**Baseline Publishing ... 30 day MBG**
7785 ❼Talking Moose 4.0.2 ..... 22.
Broderbund Software
9059 ❼Arthur's Teacher Troubles ..... 41.
6516 ❼The Playroom 2.0 *(CP) (color)*..... 29.
❼Carmen Sandiego Series *(CP)*..... *ea.* 29.
8285 ❼Where/World Carmen Sandiego Deluxe 47.
3559 ❼SimAnt or 5871 ❼SimCity Supreme. *ea.* 35.
8266 ❼SimEarth 1.1 ..... 40.
1910 ❼SimLife.... 41. 3307 ❼A-Train.... 39.
Buena Vista Software
1711 ❼Heaven and Earth..... 34.
Bungie Software
8585 ❼Minotaur 1.01 ..... 47.
★**Carina ... 30 day MBG**
7761 ❼Voyager II, the Dynamic Sky Simulator 99.
★**Centron Software ... 30 day MBG**
5910 ❼Crossword Creator ..... 39.
8525 ❼Casino Master... 39. 8524 *(Color)*.... 45.
Colorado Spectrum
2554 Mouse Yoke *(aircraft yoke adapter)* ..... 29.
★**Cyan ... 30 day MBG**
6320 ❼Manhole 1.6 ..... 19.
★**Davidson & Associates ... 30 day MBG**
3922 ❼Talking Spell It Plus ..... 28.
2574 ❼New MathBlaster Plus ..... 34.
7942 ❼Kid Works 2 ..... 34.
Delta Tao Software
2536 ❼Spaceward Ho! or 2439 ❼Strategic Conq. 36.
EARTHQUEST
8050 ❼EARTHQUEST or 3118 ❼Ecology 1.0 34.
★**Edmark Corporation ... 30 day MBG**
7155 ❼Kid Desk ..... 24.
7318 ❼Millie's Math House ..... 29.
Electronic Arts
1907 ❼PGA Golf.... 39. 2963 ❼StarFlight II .. 39.
2805 ❼PGA Golf Tournament ..... 18.
★**Expert Software ... 30 day MBG**
6219 ❼Expert Astronomer 1.0..... 29.
Graphic Simulations
8083 ❼Missions at Leyte Gulf *(req. Hellcats)*. 20.
4756 ❼Hellcats Over the Pacific 1.0.3 ..... 38.
★**Great Wave ... 30 day MBG**
6693 ❼KidsMath 2.0 or 2276 Kid's Time.. *ea.* 25.



★**Abbott Systems ... 30 day MBG**
9578 ❼*Kaleidoscope*—Create your own dazzling "screen saver" displays and have fun exploring the mysterious Mandelbrot Set—an infinite world of breathtaking color and endless detail! ..... **$25.**

4334 ❼NumberMaze.. 25. 8527 ❼*(Color)*.. 35.
1513 ❼ReadingMaze *(Color, ages 3-7)* ..... 35.
3471 ❼DaisyQuest *(Color, preschool)* ..... 35.
★**HyperGlot Software ... 30 day MBG**
(French, German, Italian & Spanish)
❼Word Torture *ea.* 32. ❼Tense Tutor *ea.* 38.
❼Pronunciation Tutor
(Span., Fren.) ea. 32. *(Germ., Chin.) ea.* 38.
★**Inline Design ... 30 day MBG**
1562 ❼3 in Three... 31. 7652 ❼Cogito ..... 37.
1944 ❼Swamp Gas 31. 1747 ❼Europe ..... 37.
7646 ❼Tinies or 7650 S.C.OUT *(Dec. '92)*. *ea.* 37.
8809 ❼Tesserae 31. 3414 ❼Mutant Beach. 37.
Innerprise
1662 ❼CyberBlast ..... 25.
Interplay Productions
1894 ❼BattleChess *(3D animation)*..... 29.
1893 ❼CheckMate *(infinite play levels)*..... 31.
★**Learning Company ... 30 day MBG**
2670 ❼Reader Rabbit 3.0 *(CP) (ages 4-7)*..... 34.
3281 ❼The Writing Center 1.0 ..... 51.

★**Global Village ... 30 day MBG**
2179 ❼*TelePort/Gold*—New! High-performance 14.4 send/receive fax/modem... **$429.**
2175 ❼*TelePort/Silver*—New! 9600 send/receive external fax/modem. Comes complete with GlobalFax software ..... **369.**

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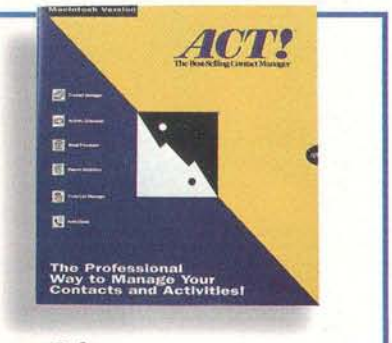
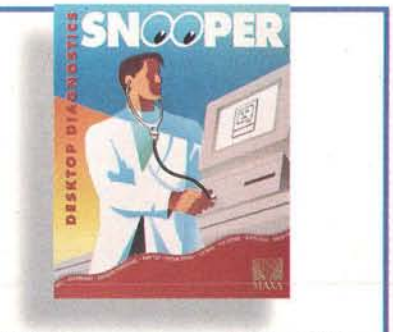


Contact Software
10317 ❼*ACT! Competitive Trade-Up*—Owners of contact , address book, calendar, sched-uling, or personal info. mgmt. software can trade-up to this professional contact-activity manager **$91.**
7636 ACT! 1.0 ..... **249.**

★Leister Productions ... 30 day MBG
7126 ❼Reunion 3.0 ..... 115.
★MECC ... 30 day MBG
3963 ❼Oregon Trail 1.1 ..... 28.
3960 ❼Number or 3959 Word Munchers ... *ea.* 18.
Microlytics
7871 ❼Berlitz Interpreter *(Dec. '92)* ..... 34.
★Microsoft ... 30 day MBG
2868 ❼Flight Simulator 4.0 *(CP)* ..... 42.
★Nordic Software ... 30 day MBG
8257 ❼Preschool Pack - Color 2.0 ..... 34.
7470 ❼Jungle Quest 30. 7537 ❼Kolor Klips 37.
★Penton Overseas ... 30 day MBG
❼VocabuLearn/ce Levels I & II *(Span., Fren., Germ., Ital., Rus., Japan., & Heb.)* ... *ea.* 35.
❼VocabuLearn/ce Level III *(Span., Fren., Germ., Ital., Rus., & Japan.)* ..... *ea.* 35.
★Personal Training Sys. ... 60 day MBG
Training for System 7, Excel, Lotus 1-2-3, Persuasion, FileMaker Pro, PageMaker, Illustrator, FreeHand, Word, HyperCard, QuarkXPress, ClarisWorks & Mac . ea. 49.
Pluma, Inc.
8695 ❼Capitalist Pig ..... 34.
★Que Software ... 30 day MBG
9743 ❼Typing Tutor V ..... 29.
Sierra On-Line
9078 ❼Stellar 7 ..... 21.
3552 ❼Leisure Suit Larry V or 7396 Red Baron 39.



★MAXA Corporation ... 30 day MBG
8692 ❼*Snooper 2.0 Hardware & Software Kit—(Dec. '92)* Sad Mac? Diagnose from your Desktop with Snooper. Check out your hardware with over 60 tests. Rate your Mac's performance. A must for your Utilities folder **$149.**

★SoftStream ... 30 day MBG
4489 ❼Galactic Frontiers *(1 to 4 players)* .... $38.
Software Toolworks
4619 ❼Mavis Beacon Typing 1.3 *(CP)* ..... 29.
★Spectrum Holobyte ... 30 day MBG
3464 ❼Tetris.... 22. 3017 ❼Wordtris 1.0 ..... 27.
4835 ❼Super Tetris *(10 levels of difficulty)* .... 28.
3459 ❼Falcon.. 33. 9113 ❼Falcon Color.... 39.
★Strategic Studies ... 30 day MBG
3287 ❼Warlords *(empires at war)* ..... 34.
StudyWare
1395 ❼StudyWare for Calculus ..... 23.
❼ACT, GMAT, GRE or SAT Prep ... *ea.* 29.
★Toyogo ... 30 day MBG
7624 ❼NEMESIS Go Master 5.0 ..... 35.
7623 ❼NEMESIS Go Master Deluxe 5.0 ..... 99.
Velocity
2934 ❼Spectre... 34. 5280 ❼LAN 3-Pak ..... 57.

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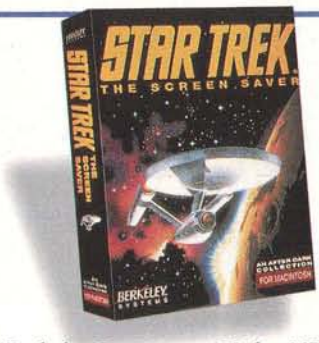
ARS NOVA
9114 Songworks 1.0 ..... 64.
Articulate Systems
7013 Voice Navigator SW w/Headset Mike.. 319.
7014 Voice Navigator SW w/Desktop Mike.. 319.
Coda Music Systems
8188 ❼MusicProse 2.1 189. 5604 ❼Finale 549.
★DiVA Corporation ... 30 day MBG
3011 ❼VideoShop 1.0 ..... 369.
E-Machines
9067 ColorLink LC 479. 9070 ColorLink DC/T 510.
9068 ColorLink SX/2 629. 9069 SX/T..... 629.
10321 ColorPage T16II ..... 1299.
9071 Double Color LC ..... 399.
9072 Double Color LX 639. 9073 SX..... 359.
9064 E-Machines T19II ..... 2299.
9066 Futura SX 479. 9065 Futura MX ..... 799.
9063 Futura LX ..... 999.
Envisio
4016 ❼Quick 16/IC *(Dec. '92)* ..... 449.
Macromedia
5486 ❼Sound Edit PRO 2.05 ..... 199.
7651 ❼Action! 2.0 ..... 349.
4598 ❼MacRecorder Sound System PRO... 239.
5087 ❼MacroMind Director 3.1 ..... 799.
2246 ❼MacroMind Three-D 2.0.2 ..... 999.
NEC
4252 MultiSync 3FGx ..... 659.
Passport Designs
8250 ❼Encore *(with free Trax)* ..... 379.
Radius
1738 Precision Color Pivot ..... 999.
7870 Rocket 33 ..... 2199.
1736 Precision Color Display/20S ..... 2499.
RasterOps
8944 RasterOps 24STV ..... 819.
Sigma Designs
6944 Power Portrait *(platinum)* ..... 769.
Software Toolworks
5201 The Miracle *(piano teacher)* ..... 349.
Sound Source
❼Star Trek: Original TV Vol. 1 or 2 ....*ea.* 30.
❼Star Trek: Next Gener. Vol. 1 or 2 .... *ea.* 35.
1759 ❼AudioClips: 2001 A Space Odyssey.. 35.
★SuperMac Technology ... 30 day MBG
4122 VideoSpigot LC 255. 4114 IIsi..... 339.
4164 VideoSpigot *(for NuBus)* ..... 379.
7676 VideoSpigot Pro. ..... 1099.
3691 VideoSpigot Pro si ..... 1099.
9074 Spectrum/24 PDQ+ ..... 1649.
7679 Spigot & Sound *(NuBus)* ..... 489.
7678 Spigot & Sound Pro *(NuBus)*..... 1189.
7677 17" SuperMatch Multimode ..... 1249.
1805 20" SuperMatch Color Display ..... 1599.
9075 21" SuperMatch Color Display ..... 2699.
4720 21" Platinum Two-Display ..... 1099.
2330 Spectrum/8•24 PDQ or 2231 PDQsi *ea.* 899.



★Berkeley Systems ... 30 day MBG
3392 ❼*Star Trek: The Screen Saver*—Beam aboard the Enterprise with Captain Kirk and Mr. Spock on a mission to prevent screen burn-in. 15 animated displays, System IQ, and After Dark compatibility..... **$34.**

CD-ROM

Broderbund
3730 ❼Just Grandma and Me *(CD-ROM)*..... 34.
CD Technology
2321 CD-ROM Caddy ... 11. 2533 *(5 Pack)* 49.
4084 America Alive! ..... 75.
8057 Porta Drive CD-ROM..... 579.
Creative Multimedia Corp.
1874 ❼Mammals of North America ..... 29.
8739 ❼Beyond the Wall of Stars ..... 40.
8744 ❼Total Baseball 40. 2484 Family Doctor 45.
★Cyan ... 30 day MBG
1343 ❼Manhole 23. 2717 Cosmic Osmo 1.1 37.
★Highlighted Data ... 30 day MBG
7771 ❼Webster's Dictionary *(CD-ROM)*..... 159.
★HyperGlot Software ... 30 day MBG
(French, German, Italian, or Spanish)
❼Berlitz Think & Talk *(CD-ROM) . ea.* 125.
ICOM Simulations
3717 ❼Sherlock Holmes, Consulting Detective 38.
★Interplay Productions
7111 ❼Battlechess CD-ROM ..... 45.
★METATEC/Discovery Sys. ... 60 day MBG
6823 ❼Best of MIDI Connection..... 31.
3683 ❼Backpac 1, 3679 ❼ 2, or 2176 ❼ 3 *ea.* 44.
4007 ❼World Almanac & Book of Facts 1992 50.
★Multimedia Library ... 30 day MBG
Image Series Vol. 1-4..... *ea.* 105.

Hewlett-Packard
8368 *LaserJet 4 (with toner)*—All NEW! True 600 x 600 dpi resolution with microfine toner. Forty-five internal scalable typefaces. Fast RISC processor. 6 MB memory, incl. toner, LocalTalk capacity, & more. **$2249.**

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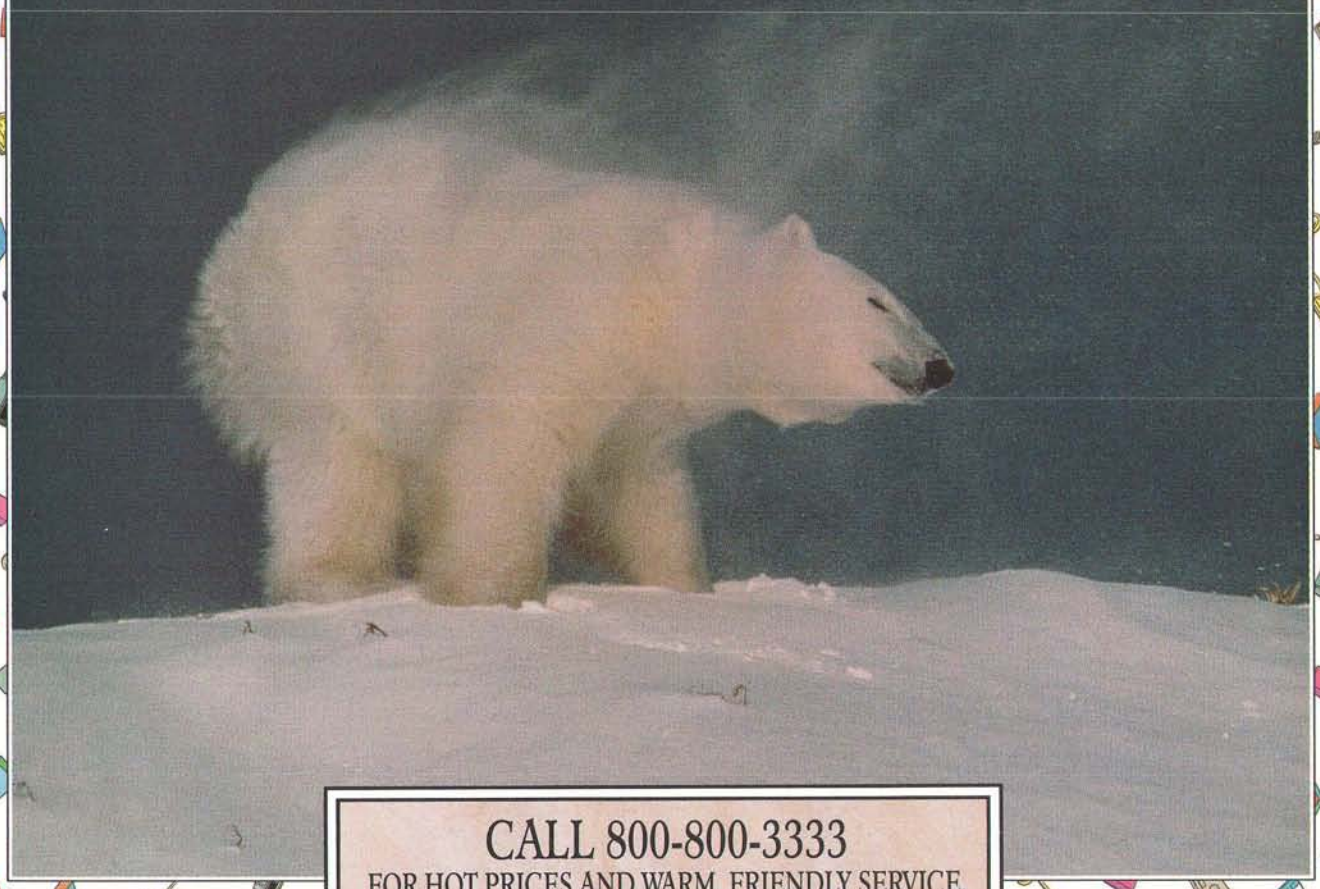

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★**Pacific Data ... 60 day MBG**

7956 LaserJet IV 1 MB 65. 7962 *(4 Pack)* $235.
7958 LaserJet IV 2 MB 109. 7965 *(4 Pack)* 419.
7959 LaserJet IV 4 MB 175. 7966 *(4 Pack)* 649.
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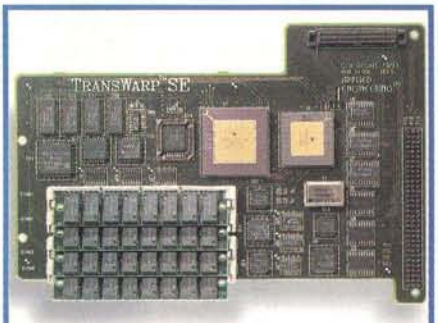

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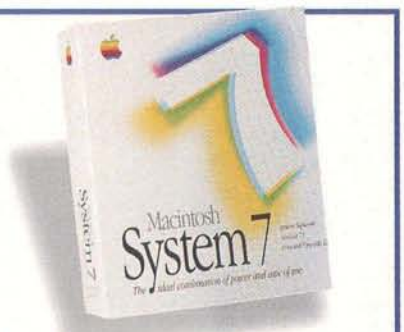

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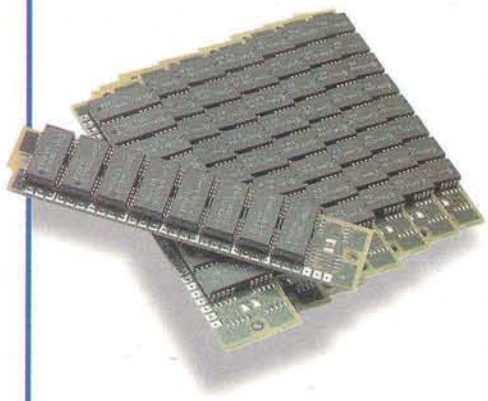

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Circle 188 on reader service card

Navigating by the Stars

BY ADRIAN MELLO

SOMETIME IN JANUARY OR February, Apple expects to sell its 10 millionth Macintosh. This milestone marks a remarkable year in which the Macintosh had a 20 percent growth in unit sales and Apple surpassed IBM to claim the title of maker of the best-selling personal computer. As the Macintosh installed base has been growing, so have the number of products available to support it. The Mac is a very healthy personal computer platform, and we all know that one of the key signs of a healthy computer is the size of the software base that supports it. But with thousands of hardware and software products now available for millions of Macintoshes, users have a problem. It's no small task to choose among all these products to find those that best meet all your needs.

Since its founding, *Macworld* has dedicated itself to helping readers find the best products for their use. Ten months ago *Macworld* nearly doubled the number of stand-alone reviews appearing in each issue to provide more purchasing guidance through the product maze. We also added ratings to our *Reviews* section to provide an immediate assessment of each product. These ratings have made it much easier to quickly evaluate the relative worth of the many products we review.

Star Ratings

THIS MONTH WE MAKE IT STILL EASIER for our readers to find the quality products that meet their requirements, by adding a section called *Macworld Star Ratings.* The *Star Ratings* section appears in the back of the magazine and includes all the products evaluated in *Reviews* over the course of the past year. Products are organized into categories and then listed alphabetically. Each product review is summarized with a star rating and one or two concise sentences that capture the essence of the reviewer's opinion.

Your search for the ideal product begins with the star rating itself. Each product is rated with one to five stars. Five stars is the best rating we give; one star is the worst. Five-star ratings are reserved for truly exceptional products that may inspire a quasi-religious experience in the reviewer. Four stars are awarded to well-designed products that excel in their respective categories. Three stars are given to good products that are reasonably effective for their intended use. Two stars means the product has one or more shortcomings that currently prevent the reviewer from recommending it. One star means the product is badly flawed or deficient and the reviewer recommends avoiding it until the manufacturer significantly improves it.

Keep in mind that ratings and reviews ultimately represent a reviewer's opinion. Different reviewers can have different takes on the same product. Products have a complex set of features applied to a varied set of jobs—no two reviewers will weigh this mix in precisely the same way. You can gain a little more insight into the rating by looking at the pros and cons listed in the header of each review. However, when you are seriously considering a product for purchase, it's always wise to read the body of the review to understand the reasoning behind the reviewer's opinion. That's why we provide a reference to the original review for each product listed in the *Star Ratings* section; we also indicate the current version number so that you know whether the product has been updated since the review was written.

Behind the Ratings

TO PROVIDE CONSISTENCY, THE EDITORS at *Macworld* ask that all reviewers apply key criteria to every product they evaluate. The main criteria that influence the ratings are interface, ease-of-use, design, documentation, support, value, performance, reliability, and innovation.

Interface has long been a key facet of the Macintosh's usability, and ratings take this into consideration. Ease-of-use covers how long it takes to learn to use the product and in what stages users are exposed to more-complicated features. When evaluating a product's design, the reviewer considers whether the product's features are well chosen and well implemented. Documentation and support are important because it's not enough to create a good product without providing a solid framework for using it. Support is especially important; users need to be able to count on a company's assistance. Judging the value of a product requires the reviewer to ask whether the product is competitively priced and whether it's priced reasonably for the job it performs. Performance includes an appraisal of the product's speed and responsiveness. Reliability is crucial because even a fast and well-designed product can be useless if it's incompatible or buggy. Finally, the rating includes a consideration of how innovative a product is. Macintosh products have a proud history of pioneering new application areas as well as providing more-elegant solutions for existing categories. We think it's important to reward products that continue this tradition.

Guidance through the product maze

PowerBook Notes

IN ADDITION TO *STAR RATINGS,* WE'VE also started publishing a monthly column called *PowerBook Notes.* Using a PowerBook has become a new way of life for many Macintosh enthusiasts, judging by the 400,000 PowerBooks Apple sold last year. *PowerBook Notes* is written by *Macworld* contributing editor Cary Lu, who has been writing about the Macintosh since its introduction in January 1984. This issue's premier column begins by telling you how to get the most out of your PowerBook by paring down software overhead to produce an astonishingly lean system that maximizes available storage and memory.

We hope that, like the Mac, *Macworld* will continue to improve with time. *Star Ratings* and *PowerBook Notes* are both the result of readers like you telling the editors how the magazine can better meet your needs. As the new editor-in-chief of *Macworld,* I am especially interested in finding out what changes and additions you would like to see in coming months. Please write to me with your ideas so we can continue to keep our fingers on the strong pulse of the Macintosh. m

A color publi
so revolutiona
news every

Take any big story in the San Francisco Examiner.® The Oakland Hills fire. The Gulf War. The fall of communism. The Giants leaving. And Radius had a hand in it.

The Examiner cranks out five editions every day. With deadlines ranging from a merely frantic three hours, to a maddening, ulcer-inducing 40 minutes.

Pretty impressive. But what's really remarkable is that they put them all out in color. Thanks to Radius.

ROCKET SPEED HELPS THE EXAMINER PUT OUT FIVE COLOR EDITIONS A DAY. BY THE LOOKS OF THINGS, THEY NEED IT.

How do they do it? Chris Gulker, Director of Development at the Examiner, explains. "We have to work fast." An understatement. "And Rockets have given us the speed we need to really make doing this kind of intensive color work feasible on a desktop system.

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"Radius' Color Matching System represents another major breakthrough for us in terms of hitting really tight deadlines. Rather than going through the whole rigamarole of waiting for proofs then making all the necessary adjustments, we now have complete confidence that what we see on the monitor really is what we'll get in print.

"With this high level of comfort in the color on our screens, we've basically been able to turn our journalists into color separators. Which means we save in terms of both time and personnel.

"We've also done a lot with video frame grabbing. During the Gulf War, for example, the best images were coming from CNN. Using Radius products, we could put TV shots in the paper that were still of a very high quality."

"WE CAN GET A COLOR PICTURE FROM THE PHOTOGRAPHER'S CAMERA TO THE PRESSES IN THE SPACE OF 40 MINUTES."

On any given day, you can see six Rocket-equipped Mac IIci's and cx's with

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large Radius displays working fast and furious. And, of course, each one comes loaded with Radius 24-bit color.

Satisfied though they may be, the Examiner sees better days ahead. "We're hoping to get set up with RocketShare as soon as possible. That way, while we're waiting for color to separate in the background, we can work on layout and photo editing on the screen. It's going to make life around here a lot easier."

Of course, you don't have to put out a multiple-edition city paper or work under crushing deadline pressure to appreciate the power of our color publishing system.

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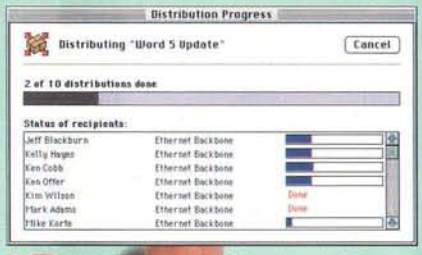

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Circle 268 on reader service card

Letters

FEBRUARY 1993

Dead Technology

I HAVE JUST FINISHED READING YOUR article on the Performa 600, and I must say, I have seen the beginning of the Mac's death ("Mass Market Macs," November 1992). Now, now, take it easy. No one loves the Macintosh OS and available software more than I do. But the rest of the world is progressing at a rate faster than Apple can manage in the hardware department.

Intel and Microsoft are set to unveil the '586 (P5) and Windows NT. IBM clones will offer computers with more than ten times the performance of the Performa 600 for a few hundred dollars more. How does Apple expect to hold them off with two-year-old, mediocre technology?

Philip Ebbert
Los Osos, California

I JUST RECEIVED MY FIRST ISSUE OF *Macworld* and I found the article "Mass Market Macs" very interesting. I just purchased my first computer. During the first week of trying to use it, I was ready to take a hammer to the whole mess.

The problem is the assumption that whoever buys a computer knows computers. If Apple thinks they will increase sales to first-time buyers by just offering Macs for sale in Sears, I think they're going to be disappointed. If I hadn't had the help of my son, I wouldn't have bought one.

What else should Apple do, then? Perhaps display some definitions and interpretations at the point of sale—define RAM and ROM, monitor, modem, mouse, and keyboard. Relate bits, bytes, kilobytes, etc., to how many pages of print they are equal to. Above all, the sales personnel should use everyday English rather than lapsing into computer language. Unfamiliar words will scare prospective buyers.

A. W. Ackley
Cincinnati, Ohio

ONE COULD MAKE A CASE FOR COMparing the Performa 600 to the Mac IIsi on a cost versus performance basis. Assuming a $2500 cost for a Performa 600 with 5MB of RAM, a 160MB hard disk, and the Apple CD 300i, you would be easily beyond the capability of most any IIsi package offered in the ads at the back of *Macworld*. Most IIsi offerings run between $2500 and $3500; this for a 25MHz system with a single expansion slot requiring an adapter and no separate video RAM or extra internal drive bay. Give me an Apple Color RGB monitor, a 33MHz math coprocessor, and a full-blown, full-featured System 7 (rather than the watered-down one offered with the Performa series), and the Performa 600 would have me saying "Mac IIsi? What's a Mac IIsi?"

Joel Alvin Christine
Tyrone, Pennsylvania

To Each His Own Accounting

THANK YOU FOR PUBLISHING "BALancing the Books" (November 1992). It was helpful seeing 24 financial packages summarized and put in their place, that is, organized into groups with similar capabilities. And of course, Jim Heid's "Small-Business Accounting" (*Getting Started*) was an excellent companion article.

While the overview with its features chart covered many of the requirements in day-to-day use of an accounting package, there was little mention of the needs of a CPA performing a year-to-date general ledger; and general journal entries with additional description lines are all-important when handing the books over to a CPA. While most of the packages listed do include sufficient audit-trail capabilities, several of the low-end packages, especially those in the personal-finance group, do not. Even these packages will often have ways of faking it, but the targeted user (a business owner trying to keep his or her own books) is not likely to

continues

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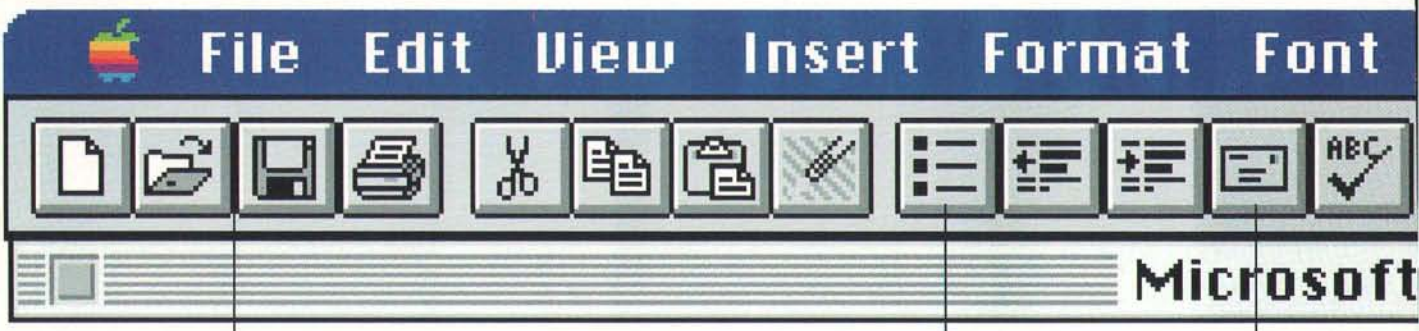

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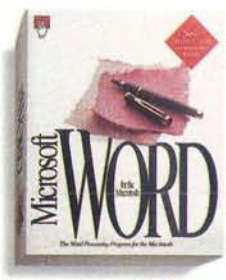

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CORRECTIONS

"Insights on Lotus 1-2-3 for Macintosh" (December 1992) incorrectly described how to include computed records on a form. The actual data for a record selected on the entry form resides on line 515 of that same form.

recognize this, and is thus open to having a year of data-input efforts deemed useless by a CPA.

One inexpensive and easy-to-use package that provides a complete set of accounting was left out of the overview. As a cash-basis business accounting package, CheckMark Software's Cash Ledger bridges the gap between personal-finance and accrual-based software.

Wayne Higdon
Albany, New York

We covered Checkmark MultiLedger 2.0, which includes the capabilities of Cash Ledger.—Ed.

ALAN SLAY OMITTED THE OLDEST, best, and simplest accounting program to use, Dollars and Sense from Software Toolworks. As a certified public accountant, I find it suitable for small service businesses, including corporations and sole proprietors that do not have a need for keeping a detailed inventory and are operated on a cash basis. Best of all, like Quicken, Dollars and Sense costs less than $60.

Howard Lisch
New York, New York

We will review Dollars and Sense in an upcoming feature on personal finance. Even though this reader uses it for accounting, it is really geared more toward personal finance and competes in features and price with Quicken. The accounting article was intended to review products designed for traditional accounting. Please also note that Business Sense, Inc., has acquired Dollars and Sense from Software Toolworks.—Ed.

I HAVE FOUND THE DOCUMENTATION with Wetzel & Company's Profitability Professional to be more than adequate. Profitability is packaged as, and performs as, a stand-alone program. Unfortunately, many people still think of HyperCard as a toy. HyperTalk has allowed a small software publisher to put forth an accounting program that holds its own with the best of them.

Carmine Picarello
Westport, Connecticut

YOUR ARTICLE DID NOT ADDRESS what I consider to be an important feature of any accounting package: the ability to correct typographical or clerical errors made in recording data.

The argument, as I understand it, is that by making it impossible to correct typographical errors, it is more difficult for unauthorized users to embezzle funds. I do not have any concern for employee dishonesty and want to have the option to make such electronic corrections. In trying to help me solve this problem, a dealer has let me take a look at M.Y.O.B, which does permit the user to select a Changeability option. Your article fails to consider this capability.

Samuel Field
Kalamazoo, Michigan

I SEE THAT YOU INCLUDED BUSINESS Sense. I am a little surprised that they are still out there somewhere. I bought Business Sense and have found it to be a good package in many respects. It does, however, have two major problems. It is poorly documented and the publisher is totally unresponsive.

When I received the package from a well-known mail-order house, it did not have a registration card. I sent a letter to

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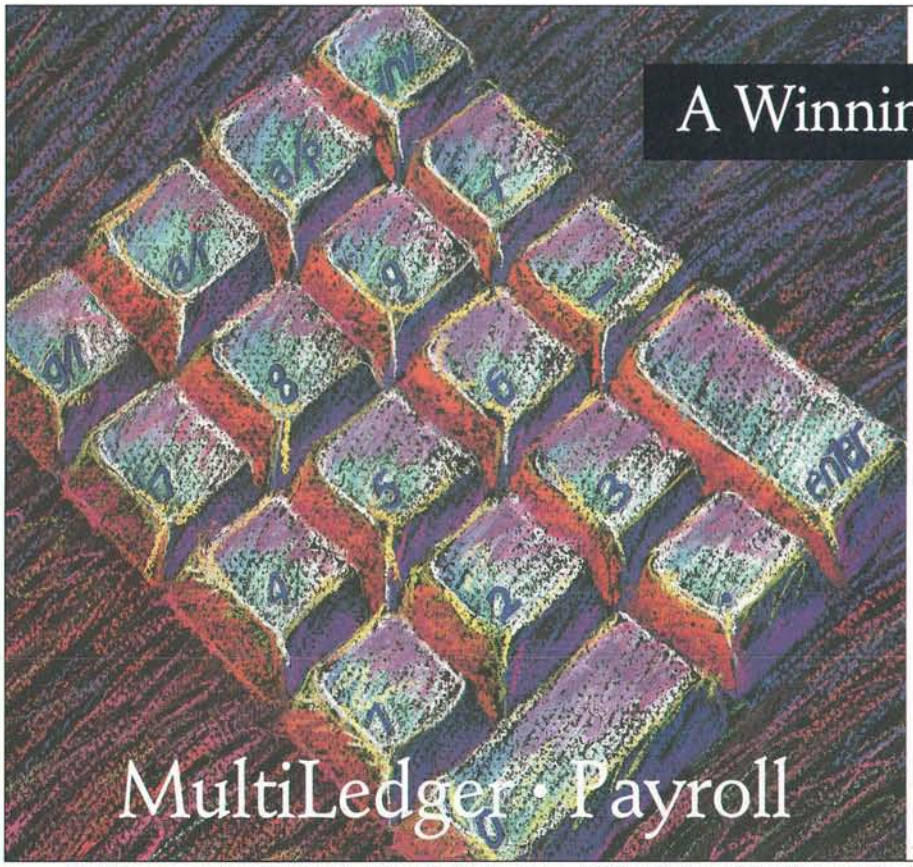

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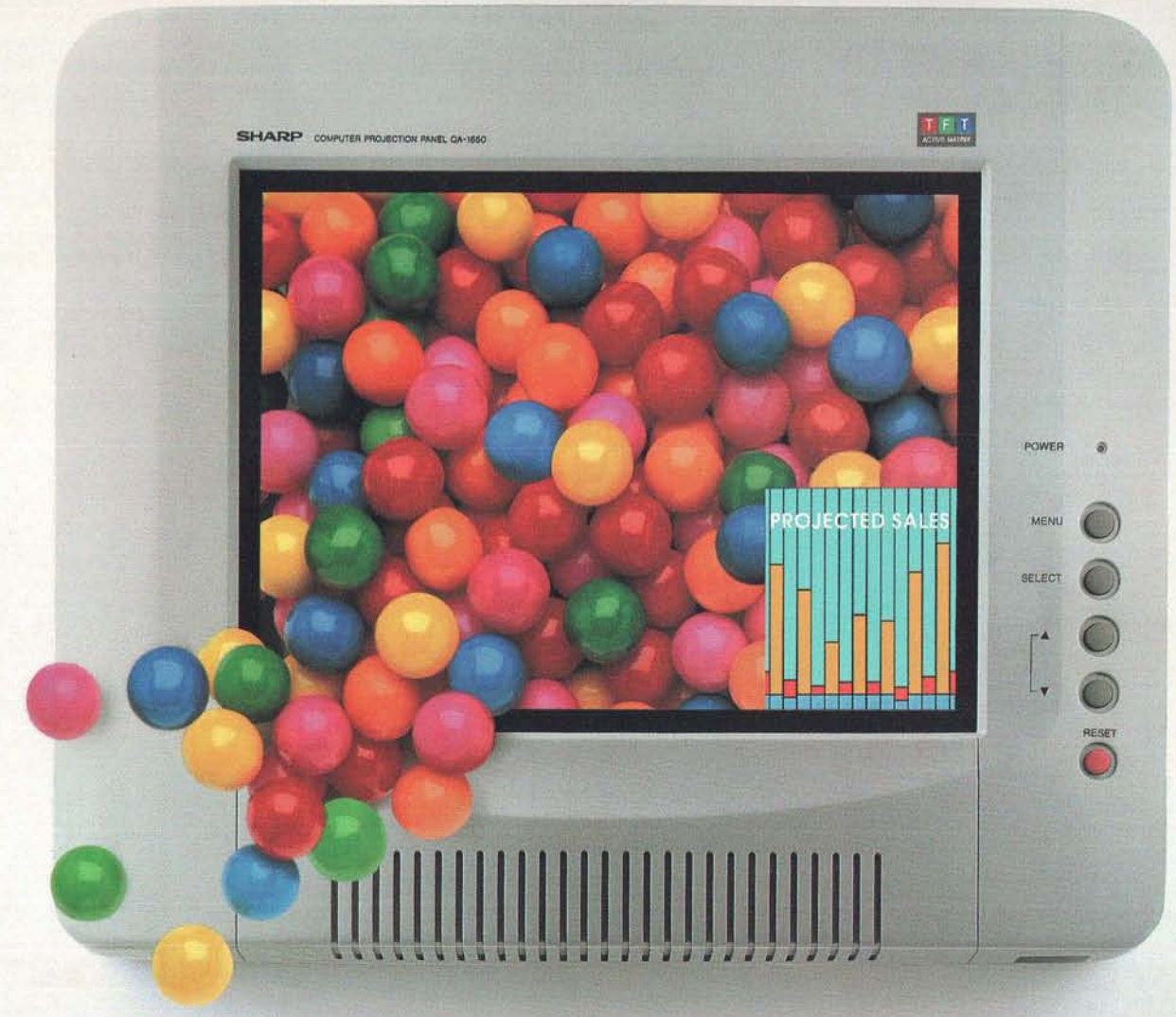

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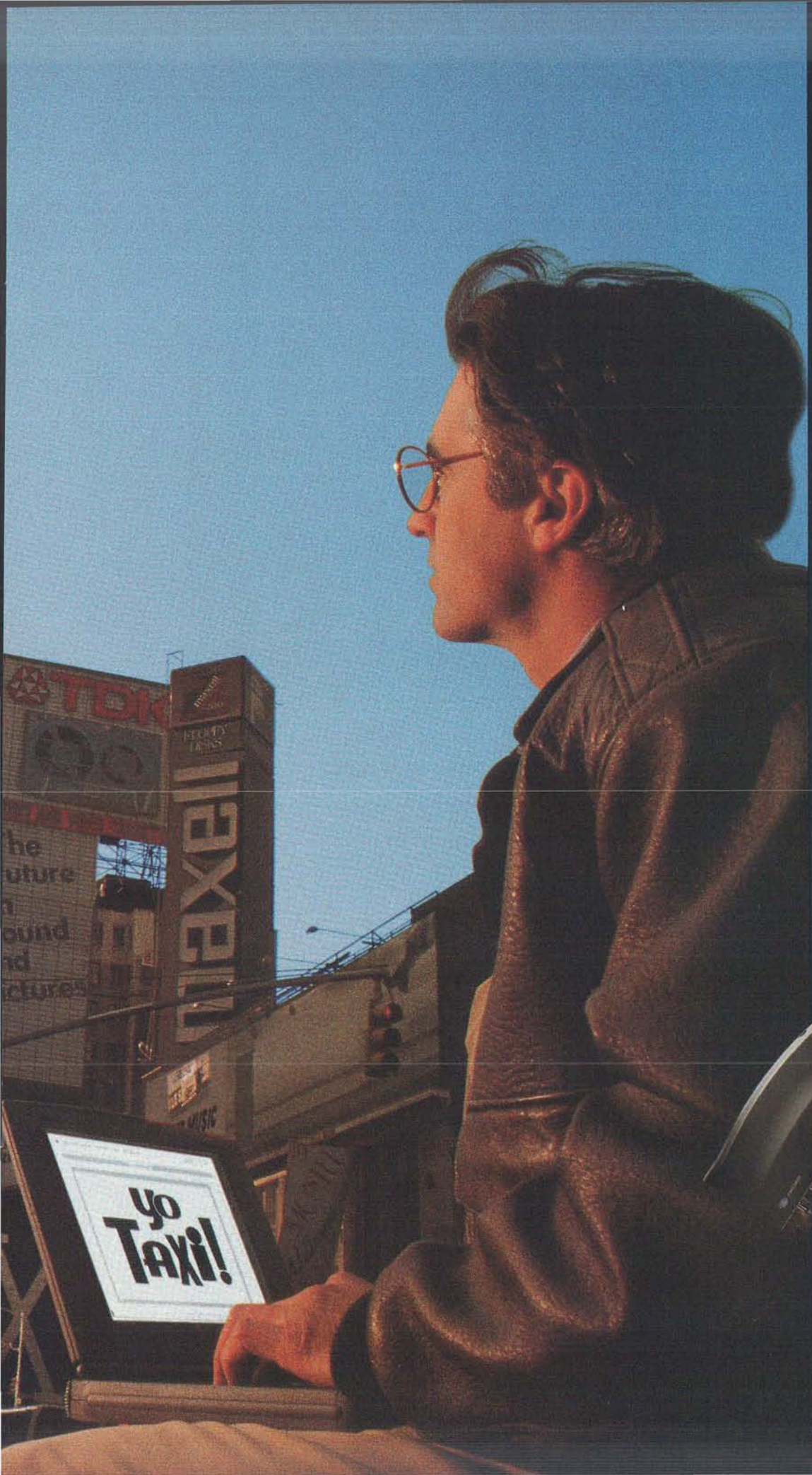

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Wyoming Software, which is listed as the publisher in my documents, requesting a registration card, and received no response. I sent a registered letter with a return receipt. Someone there signed for the registered letter, but I am still waiting for any kind of response.

Joe Aldrich
Kingwood, Texas

Wyoming Software closed its doors earlier this year. (For more information, see *Conspicuous Consumer*, October 1992.) You may have better luck getting documentation, a registration card, and support for Business Sense from the current publisher, Business Sense, Inc., at 800/377-4954.—Ed.

Storage Obsolescence

I WAS ANGERED BY MATTHEW LEEDS' article "Removable Storage" (November 1992). He declared that because the new SyQuest Mesa series of 105MB removables will soon hit the market, the Bernoullis, Ricohs, and older SyQuests will become obsolete. A service bureau or major corporation that just spent tens of thousands on 44MB and 88MB SyQuests and 90MB Bernoullis is not going to just clear out the desks to let the SyQuest Mesa 105MBs in! I have good reason to be upset: I just bought a Bernoulli 90MB MacTransportable for $499 and think that it was the best $500 I ever spent on a peripheral for my LC II.

Thomas Isakovich
Hasbrouck Heights, New Jersey

Leeds also stated that the 44MB SyQuest drives will be around for a while due to their large installed base. SyQuest has a much larger installed base than Ricoh or Bernoulli, so if you are buying a drive and will be sharing data with others who are not at your company, a SyQuest is a better choice. If, however, you are only going to swap data between drives in one company or if you are buying a drive for personal use, then any of the technologies is adequate—but be forewarned that as with all technology, current picks will eventually be made obsolete by bigger, better, faster ones.—Ed.

Poor Rating Undeserved

I AM WRITING WITH QUESTIONS about "Optical Update" (November 1992) in which FWB's technical support was rated as being poor for both our hammerDisk130 3.5-inch optical drive and our hammerDisk600S 5.25-inch optical drive. In another article in the same issue, "Removable Storage," FWB's support was rated as being good. We are concerned, not only about the poor rating, but also about the mixed signals.

We'd like to know the criteria used to determine these ratings, and exactly what we did, or didn't do, to deserve the poor rating for our support of the hammerDisk130 and hammerDisk600S optical drives. Were three calls made for each product, or were the results extrapolated to apply to both products? If our staff somehow slipped up we'll take immediate action to bring our level of service and support in line, but we don't know what went wrong without your input.

Steve Goodman
Vice President
Sales & Marketing
FWB
San Francisco, California

When we test technical support, we make three phone calls to each company in each article, not three calls per product. We rate the technicians on ability to correctly diagnose and solve each technical problem; helpfulness; and promptness of response. We average the ratings for the calls to get the final score. In this case, we do owe FWB an apology. The company should have received a good rating in "Optical Update." The discrepancy occurred because we misinterpreted a technician's response to a question when we were scoring.—Ed.

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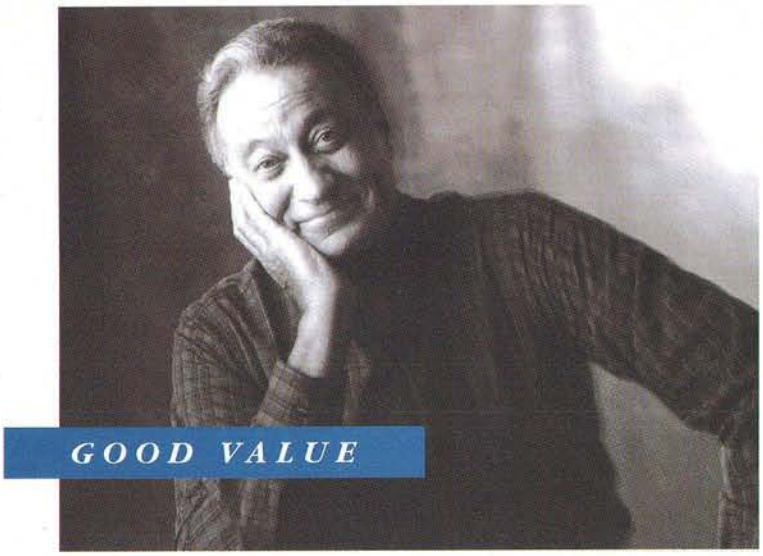
"Sure, I remember my first modem...



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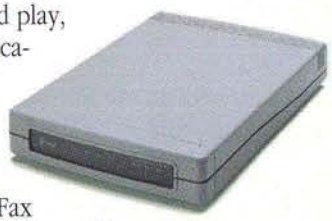

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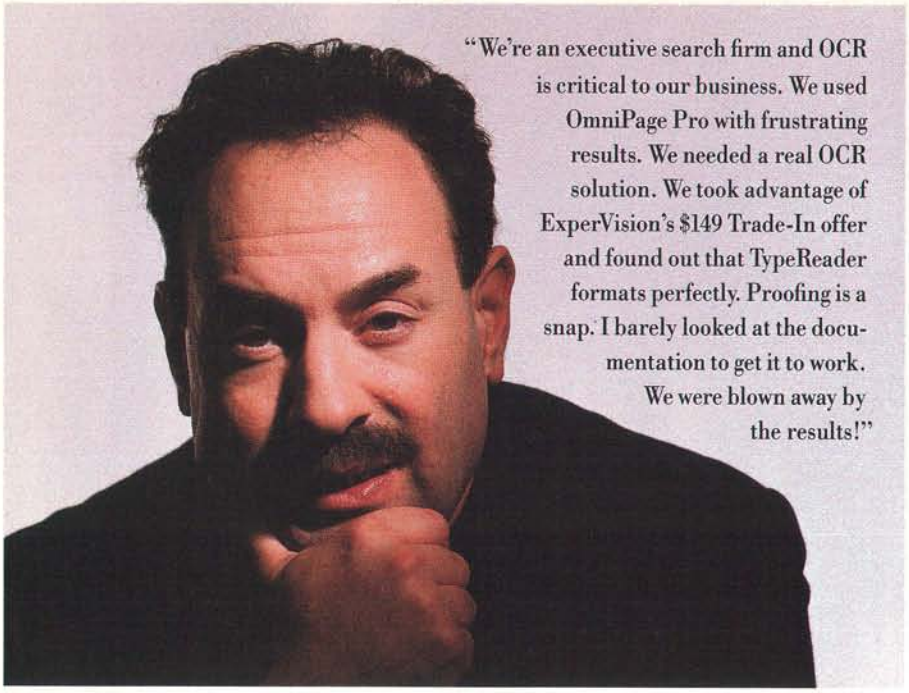

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West	232.0	+3.48	+2.50
South	186.8	-2.39	-2.25
Northwest	145.5	-3.74	-2.75
Southeast	190.6	-3.39	-2.85

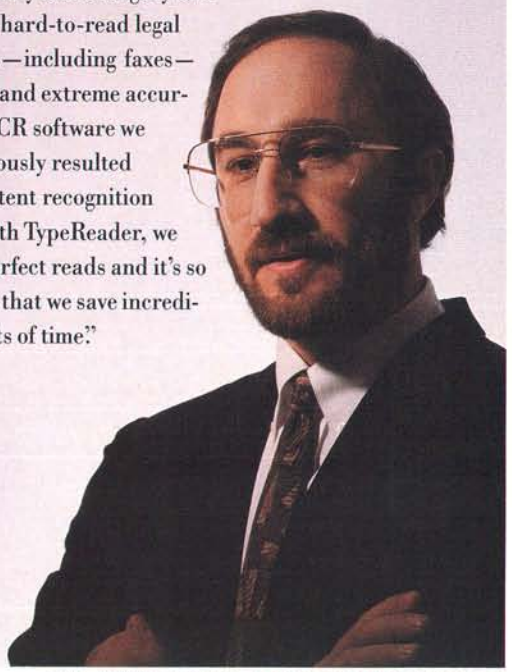
Economic picture a mix of ups and downs

With a push of a button, a Mac, and a scanner, TypeReader recognizes any document—retaining columns, font styles of various sizes for maximum productivity.

"With subsequent editions of my book, I had to re-type every single word and every single page. It was extremely time consuming. With TypeReader, I don't have that problem anymore. It's easy to use, and the WYSIWYG editor allows me to revise or edit my work on the spot. TypeReader has made my life much easier."

E. BARBARA PHILLIPS, PROFESSOR AND AUTHOR—BERKELEY, CALIFORNIA

"Our company scans lengthy and sometimes hard-to-read legal documents—including faxes—which demand extreme accuracy. The OCR software we used previously resulted in inconsistent recognition quality. With TypeReader, we get near perfect reads and it's so easy to use that we save incredible amounts of time."

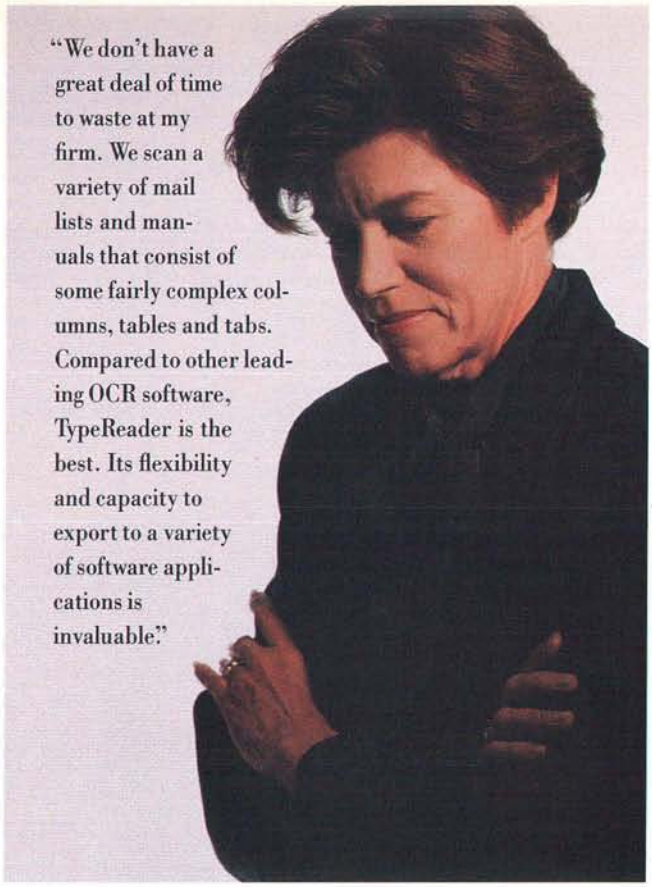


NEIL ARESTY, PARTNER—LEGAL COMPUTER SOLUTIONS

TypeReader isn't just an extraordinary OCR product. It's an extraordinary OCR tool that helps managers, owners and professionals get their work done faster. With better results than they ever thought possible. These OCR users and many others became believers when presented with the opportunity to compare leading OCR software (including OmniPage® Professional) to TypeReader software from ExperVision.

Their words speak for themselves, so we won't burden you with a lot of sales hype. We'll simply tell you that by acting now, you'll pay only $149 for TypeReader with proof of ownership of another OCR software product.† If you're not a current OCR software user, you'll get a $100 rebate when you purchase TypeReader.

You can't afford not to compare TypeReader.



"We don't have a great deal of time to waste at my firm. We scan a variety of mail lists and manuals that consist of some fairly complex columns, tables and tabs. Compared to other leading OCR software, TypeReader is the best. Its flexibility and capacity to export to a variety of software applications is invaluable."

ELIZABETH F. WAJER, FOUNDER—WORDS-WORTH, INC.

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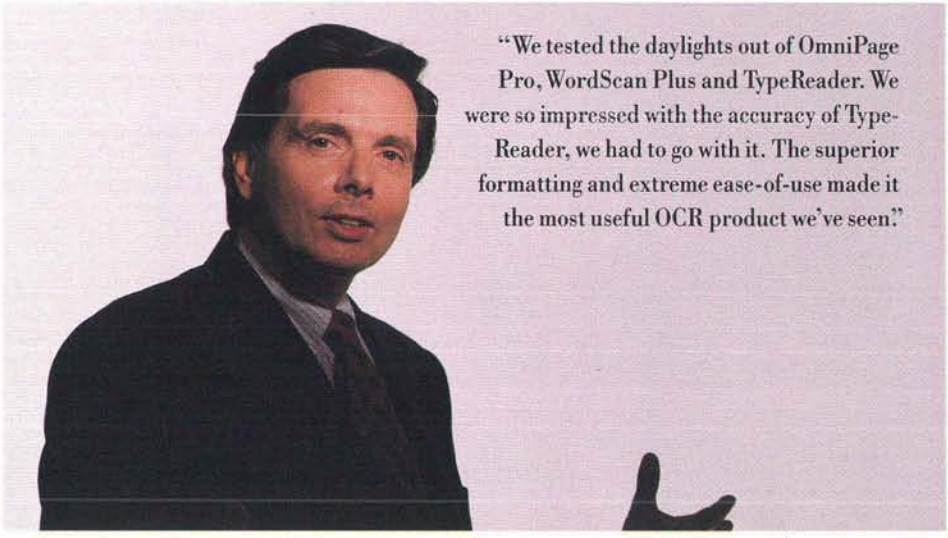

"We tested the daylights out of OmniPage Pro, WordScan Plus and TypeReader. We were so impressed with the accuracy of TypeReader, we had to go with it. The superior formatting and extreme ease-of-use made it the most useful OCR product we've seen."

MICHAEL ARATA, PRESIDENT—ANDERSON & ARATA, INC.

InfoWorld calls it "*...a quicker, better OCR with superb formatting*." Users call it the best OCR product they've ever used! We know you'll agree. That's why TypeReader comes with a 30-day money back guarantee.

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Circle 170 on reader service card

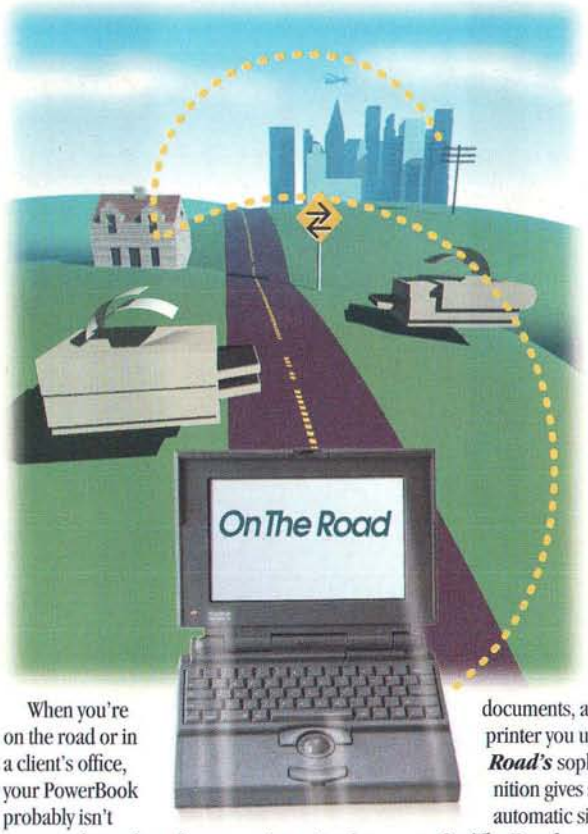
Consider the Color-Blind

I GREATLY ENJOYED THE ARTICLE ON data representation by Charles Seiter in the October issue ("What's Wrong with This Picture?"). However, I would like to point out another potential problem in constructing color charts. A small proportion of the population (7 percent of North American men, 1 percent of women) is red-green color-blind, a hereditary condition that results in an inability to distinguish between these two colors. Unfortunately, there seems to be a propensity to use this color combination, perhaps because of the stop-go traffic-signal metaphor. Six of the ten color illustrations in the article use these two colors.

I would encourage those who make charts to avoid the red-green combination so that charts can be attractive, accurate, and readable for "the rest of us."

T. Rosenal
Calgary, Alberta, Canada

Print or fax at 70mph



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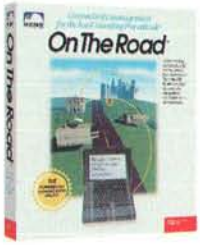

When you're on the road or in a client's office, your PowerBook probably isn't connected to a phone line or a printer. But that doesn't mean you can't finish the work you need to do.

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Circle 228 on reader service card.

Ween Catches a Bug

I HATE TO BE A TECH WEENIE, BUT you have a small bug in your "Inside the Processor" article (October 1992). On page 142, you have an illustration of a processor tracing a calculation. The instruction you claim to be tracing is "Add 32 digits in a register to a memory address." The instruction you display in Stage II of the diagram is, however, the following:

1101 0001 0110 1101
0001 1110 0101 0110

which translates to

add.w d0,$1E56(a5)

This is, of course, valid, but if the application programmer expected a 32-digit add and got a 16-digit add instead, the results could be disastrous.

Sheridan Rawlins
Waltham, Massachusetts

We love tech weenies, and you're absolutely right. We started off using 16-bit instructions because we were going to illustrate the 68030, but then we switched to a 68040 to match the photograph and forgot to use the **add.l** instruction for long (32-bit) words instead of **add.w** for regular (16-bit) words. —Ed.

I HAVE NEVER FOUND THE NEED TO write to you regarding an article that you have published; however, I feel obliged to do so at this time to clarify some misconceptions that you may have inadvertently passed along to your readers in the article "Inside the Processor."

"Fabricating Transistors," a section of the sidebar "Making a Processor," describes the process that is used to fabricate the microprocessor.

The statement "the exposed photoresist hardens" is descriptive of an older technology known as negative photoresist. In most modern fabrication facilities, negative photoresist has been replaced by positive photoresist because it can produce extremely fine, that is, 1-micrometer or less, patterns; this capability was absent in most negative photoresists.

You also mention that a machine "shoots ions at the wafer," and this is true. High-energy ions are implanted into the silicon to create the semiconductor properties of the device. This may be done several times. However, this process is not known as etching but as implantation. In addition, an integrated circuit or transistor must have electrically conducting features, usually metals, to connect the various circuit elements such as resistors, capacitors, and transistors. The patterns in the metal can be created by etching away unwanted metal after patterning the pho-

continues

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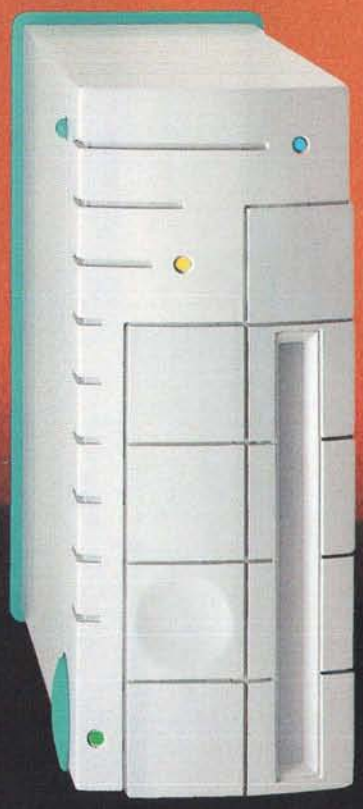
Byte



"... the PMO-650 was a veritable rocket."

Christopher Stetson
PC Week

TYPE: 3.5" OPTICAL
CAPACITY: 128 MB
SIZE: 6.9" (H) x 2.7" (W) x 8.3" (D)
WEIGHT: 4.11 LBS
MOUNTING: VERTICAL OR HORIZONTAL

Are you burning through megabytes of magnetic storage? Buying hard drive after hard drive? Are 88 MB removable disks too slow and limited in capacity? It's time for an optical hard drive!

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MW Optical Performance Tests

Overall Fastest		Duplicate (in seconds)	Write (in seconds)	Read (in seconds)	Open Photoshop (in seconds)	Save Photoshop (in seconds)	Open Pagemaker (in seconds)	Save Pagemaker (in seconds)	Retrospect Backup (in seconds)	Sound (in dBa)
Color Key	1.00 Pinnacle Micro PMO-650 (R)	33.49	18.29	17.68	27.72	23.75	46.66	62.4	461.0	42.2
Fastest	0.86 PLI Infinity Max Optical (M)	44.72	24.60	19.11	32.25	28.44	48.10	106.8	508.8	42.1
Percent slower than fastest	0.79 MacDirect NuDesign Optical (MO)	47.18	33.08	25.96	36.64	35.91	56.90	142.3	570.8	43.1
Up to10%	0.78 Liberty Systems 115MO (MO)	48.11	32.40	25.74	37.99	36.51	52.35	128.8	560.3	40.8
11%-20%	0.75 DGR Technologies 128REM (MO)	47.58	31.68	25.75	36.77	34.31	53.13	145.0	570.4	38.0
21%-29%	0.79 Ocean Microsystems Vista 128 (MO)	48.59	34.57	26.33	36.62	36.15	51.52	145.6	571.9	45.2
30% or more	0.79 MacProducts Magic 128 REAM/MO (MO)	48.12	34.15	27.86	36.86	36.34	51.61	146.5	572.8	36.1
	0.77 Generation Systems 128MB Optical (MO)	48.12	31.05	28.31	36.99	35.96	51.05	147.3	569.9	40.7
	0.77 Mirror Technologies 128MB Optical (MO)	48.36	33.74	28.41	37.35	36.08	52.16	147.5	569.9	42.4
	0.76 Relax Erasable Optical Vista Hyperspace (R)	99.95	31.89	21.86	38.16	31.13	62.91	147.0	598.0	50.6
	0.75 Storage Dimensions MCO1-1000 (M)	56.35	32.05	29.44	36.60	35.94	63.60	160.5	617.7	50.2
	0.72 Pinnacle Micro RED-1305 (S)	54.27	33.23	25.14	40.82	36.18	62.60	159.3	588.2	50.8
	0.72 Sony RMO-S350 (S)	54.18	33.11	24.81	41.64	36.33	63.20	160.6	559.5	47.5
	0.71 PLI Infinity Optical 3.5" (S)	53.41	33.20	24.78	42.91	38.77	63.31	160.2	567.3	43.4
	0.71 Optima Technology DisKovery 128 (S)	54.60	33.11	25.31	43.16	38.47	64.12	160.9	564.7	49.1
	0.70 Relax 128MB Optical Sierra (R)	54.12	32.66	30.58	42.30	40.12	59.82	171.9	580.2	39.7
	0.70 Tulin Technology A-Hive Jr. MO-120 (R)	54.24	31.18	30.24	42.54	40.72	58.60	175.3	580.2	45.7
	0.70 Mass Microsystems DataPak MO/128 (MA)	54.32	31.19	30.09	42.60	40.97	58.79	176.8	579.3	38.6
	0.70 Li Cie 128MB Cirrus Optical (MA)	54.31	31.37	30.24	42.60	41.43	58.96	173.4	579.5	42.4
	0.70 TASS Optical World PL128 (MA)	54.38	32.59	30.45	42.83	40.65	58.96	178.5	579.5	42.0
	0.70 Radime Systems Condor 650e (R)	57.31	34.18	31.66	40.91	37.64	63.54	165.5	640.3	42.6
	0.70 Radime Systems Condor 130e (R)	54.42	31.68	30.62	43.07	41.15	59.46	175.4	604.4	40.7
	0.69 Procom Technology MEOD128 (M)	54.54	31.68	29.75	42.97	37.09	58.74	212.8	574.1	48.7
	0.69 MicroNet Technology SB-TMO-1000 (M)	51.96	29.30	30.36	38.59	39.74	67.28	185.1	604.8	40.7
	0.68 Optical Access Access RDrAxis (MA)	58.17	36.81	30.75	45.85	43.52	59.41	176.2	709.6	40.3
	0.67 Bound [illegible] HS (R)	52.88	28.33	[illegible]	44.23	39.16	64.74	[illegible]	627.8	47.1

The drives are listed from best overall performance (top) to worst. To determine rankings, we indexed overall performance numbers against the fastest drive. Index numbers are to the left of product names.

We measured each drive's ability to duplicate a 3.2MB 4th Dimension file, write a 3.2MB file to the optical disk, read a 3.2MB file on the optical disk, open and save a 3.5MB Photoshop file, open and save a 2.6MB PageMaker file, and conduct 73.4MB Retrospect

Macworld Magazine, Nov. 1992 "Optical Update". Forty-three drives tested. 5.25" mechanism standings: 1) Pinnacle Micro PMO-650, 2) Maxoptix Tahiti II, 10) Ricoh Hyperspace, 28) Sony E-501, 41) Hewlett-Packard Corsair.

Trademark Owners: PMO-130, PMO-650, OHD, Optical Hard Drive, and Pinnacle Micro are Trademarks of Pinnacle Micro, Inc. ©1992. Trademarks and registered marks to their respective owners. Retail prices acquired from dealer survey 10/92.

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Charles Piller
Macworld

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Rex Farrance
PC World

TYPE: 5.25" OPTICAL
CAPACITY: 650/600 MB
SIZE: 7.3" (H) x 3.6" (W) x 10.0" (D)
WEIGHT: 7.4 LBS
MOUNTING: VERTICAL OR HORIZONTAL

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88 MB Removable Magnetic Disk	$2,394	$3,790	$6,367	$11,734

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toresist, or by depositing metal on top of the photoresist-patterned wafer and subsequently washing away the metal along with the photoresist on which it sits.

Brad Cantos
San Francisco, California

Favorite Tip

I SAVED $150 DUE TO A SIMPLE TIP IN your *How To/Quick Tips* section (November 1992). When I receive the magazine, it is the first section I turn to. Using the tip, I was able to convert my HyperCard 2.1 that was bundled with my Mac to the scripting level. Because of this, I did not have to buy the HyperCard development kit. Thank you.

Michael Hazen
via CompuServe

For those of you who missed the tip: In HyperCard, go to the Preferences card, display HyperCard's message box, type the command **magic,** and press the return key.—Ed.

Review Response

YOUR NOVEMBER 1992 REVIEW OF NightWatch II failed to understand the modular positioning of the product. NightWatch II's locking techniques, user privileges, and true site-license capabilities are unique. The benefits from those features were not addressed. Instead, your reviewer focused on circumventing screen privacy, a user convenience we do not even consider security. This approach ignored the product's principal modular purpose—hard disk locking. If access protection is required while the machine is in use, use FolderBolt or MacSafe II.

We continue our high respect for *Macworld* and its writers. In the future, however, we hope that greater efforts will be made to identify and address product positioning in your reviews.

V. G. Nesbitt, CEO
R.C Wesolek, COO
Kent Marsh
Houston, Texas

The manual says that "NightWatch II can lock your screen securely . . ." I spoke with Kent Marsh's lead technician, and he verified that the screen locker can be circumvented. This possibility is not mentioned in the documentation. I did not focus on the modular positioning of the product because this was not a collective review of Kent Marsh products. Also, throughout the software manual NightWatch II is touted as being "a complete security system for Macintosh hard disks." After spending up to $159 for NightWatch II, I would be less than enthusiastic about spending the additional $129.95 for FolderBolt for a really complete solution.—Matthew Clark

CD ROM, Not Record

LIZA WEIMAN STATES, "WITHOUT the drop in speed, music would sound like a 33-rpm record played back at 78 rpm" ("CD ROM Drives: Into the Mainstream," October 1992). This is ridiculous. The DAC (digital-to-analog converter) is crystal controlled and spits out audio at a 44.1kHz word-clock rate regardless of how fast data is being fed it. The worst that could happen is that you would overflow the buffer.

John Pond
via America Online

Flakes in FreeHand

I FEEL I MUST RESPOND TO DEKE McClelland's response to my letter about his June 1992 review of Aldus FreeHand 3.1 (*Letters*, October 1992). First, I remember reading that the EPS file format was developed as an export/import-only format. Second, I tried the experi-

continues

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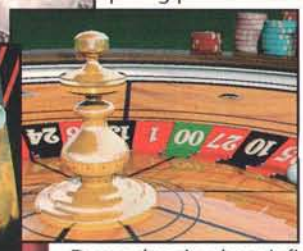

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ment of exporting a simple textless file (one rectangle) in EPS format from FreeHand and trying to open it directly with FreeHand. After I removed EPS Exchange from the FreeHand folder, it opened the file but changed the location, fill, and line of the rectangle. That definitely is flaky.

Oh, well, despite its arcane faults, I prefer FreeHand because I find it more intuitive and predictable for producing line art to a laser printer, color separations to imagesetters, and color slides and overhead transparencies to film recorders than anything else I've tried.

Bill Ware
Cleburne, Texas

More on Our Schools

THANK YOU FOR YOUR COVERAGE of the deterioration of America's schools (September 1992). "America's Shame" exposed the mistakes and lack of forethought for which the administrators of our public schools have become known. This indeed is an issue computer users and makers should be aware of and involved in. Our future depends on it.

James Staten
Mill Valley, California

YOU SHOULD BE COMMENDED FOR your work as a medium for encouraging change in the American school system. I am in my second year studying computer science at Worcester Polytechnic Institute, and through my years of education I have seen firsthand the lack of emphasis placed on computer education, the lack of computer training American teachers have, and the misappropriation of resources in primary and secondary education.

It is necessary to draw bright, fresh new computer professionals into the field of education. In addition to training current teachers in the use of computers, we must provide our schools with computer professionals who can teach the skills students will need to carry them into the twenty-first century.

Paul Cousineau
Worcester, Massachusetts

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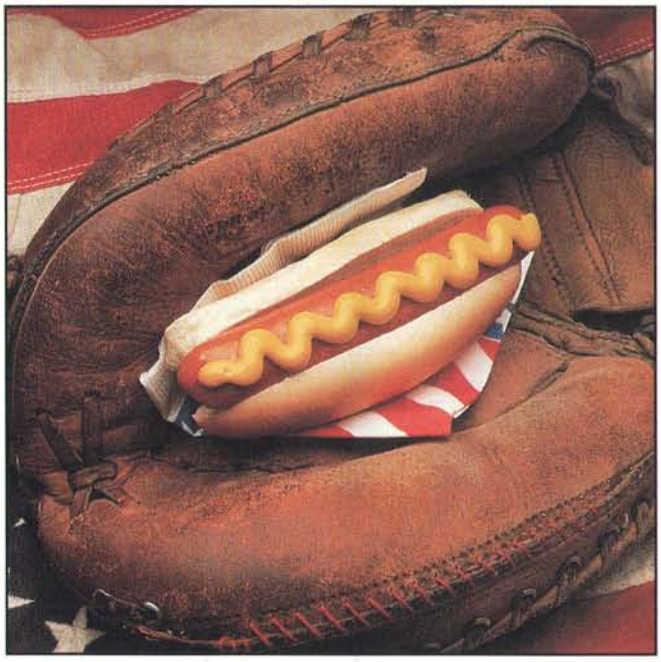

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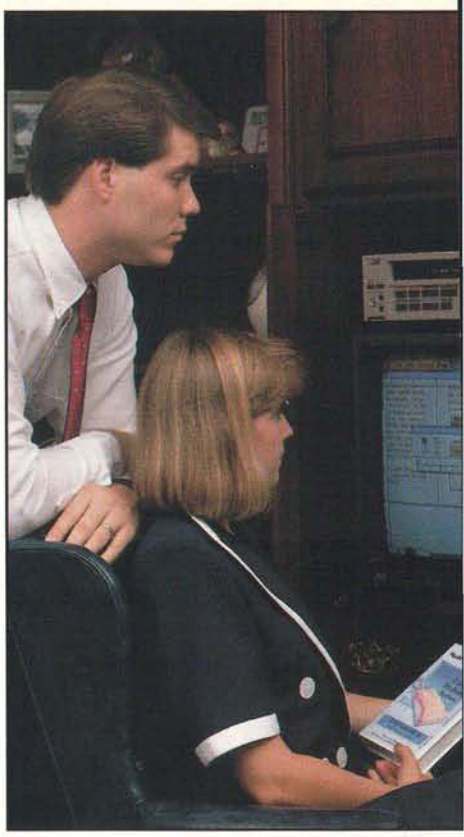

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Art Beat

Behind Macworld's Graphics

BY CATHY ABES

Artist: Diane Fenster is an illustrator, fine artist, and designer based in Pacifica, California, who has been working on the Macintosh since 1985. Once she conquered her fear of computers, she found the Mac to be a perfect environment for transforming her traditional collaging into an electronic art form.

Hardware: Mac IIfx with 32MB of RAM and a 425MB Quantum internal hard drive; 337MB Wren Runner external hard drive; SyQuest 44MB removable-cartridge drive; 128MB Sony rewritable optical drive; Nexus FX 55MHz accelerator board; AppleColor 13-inch monitor; SuperMac Spectrum/24 24-bit accelerated graphics board; 19-inch MegaGraphics monochrome monitor; AppleScanner with Abaton gray-scale upgrade.

Software: Adobe Photoshop 2.0.1.

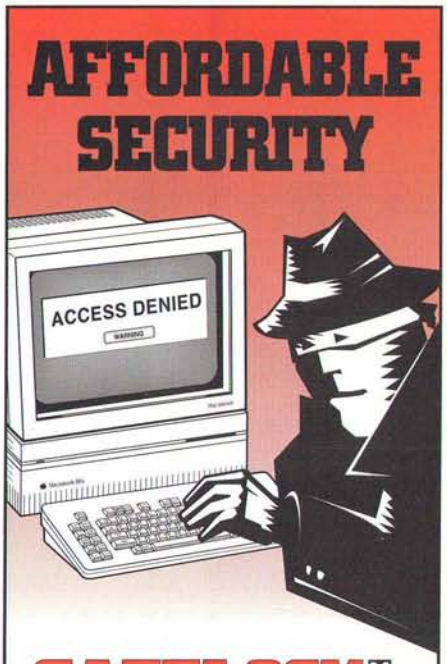
How It Was Done: For the illustration that opens our feature on security products, Fenster began by making a rough sketch in Photoshop (in gray-scale mode) by scanning in various elements: the woman, the padlocks and keys, the man's head, the door and steps, the hand, the starry background, and the moon. Then she arranged other images on top of the starry background and printed out a laser copy on which she hand-sketched some of the missing details for rough placement: the Mac and the encrypted code displayed on its screen.

The illustration that opens our feature on security software, page 144.

Next Fenster switched from gray-scale to RGB mode and began colorizing each element in its own separate document (she filled in the patterned backgrounds later). To gradate the sky from black at the top to dark blue at the bottom, she used the magic wand with tolerance set at 1 and clicked on the black of the background. After saving that selection as a new channel within the document, she went back to the original background and brought up the palette so she could choose a range of colors for the stars. Because the document was scanned in gray-scale mode, each star had a haze of gray pixels. Selecting the paintbrush and choosing Color Only mode allowed Fenster to paint just the gray pixels around the outer edge of each star without affecting the stars' white centers or the sky's black background. On some of the stars she used the magic wand (again with a tolerance of 1) to select just the white centers, and used the blend tool to add radial fills of color.

The figure of the woman began as an old black-and-white engraving from a book of clip art. Instead of scanning it in black-and-white mode, Fenster scanned the image in gray scale. Because in gray-scale mode the scanner interpolates pixels, interpreting any areas that don't appear to be pure black or white as varying shades of gray, the image ended up with a much greater pixel depth than it would have had as scanned line art. After switching to RGB mode, Fenster applied Photoshop's Unsharp Mask filter to sharpen the image, then used the Adjust Levels command (in the Adjust submenu under the Image menu) to achieve the desired gray-

continues



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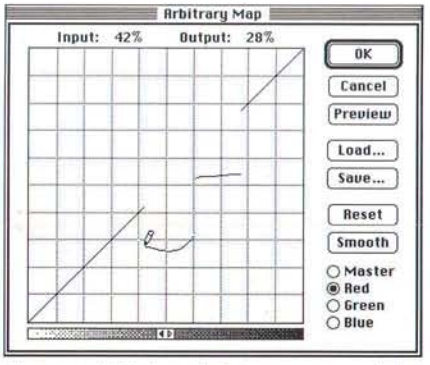
The rough layout in Photoshop, in which scanned elements were added for proper positioning.



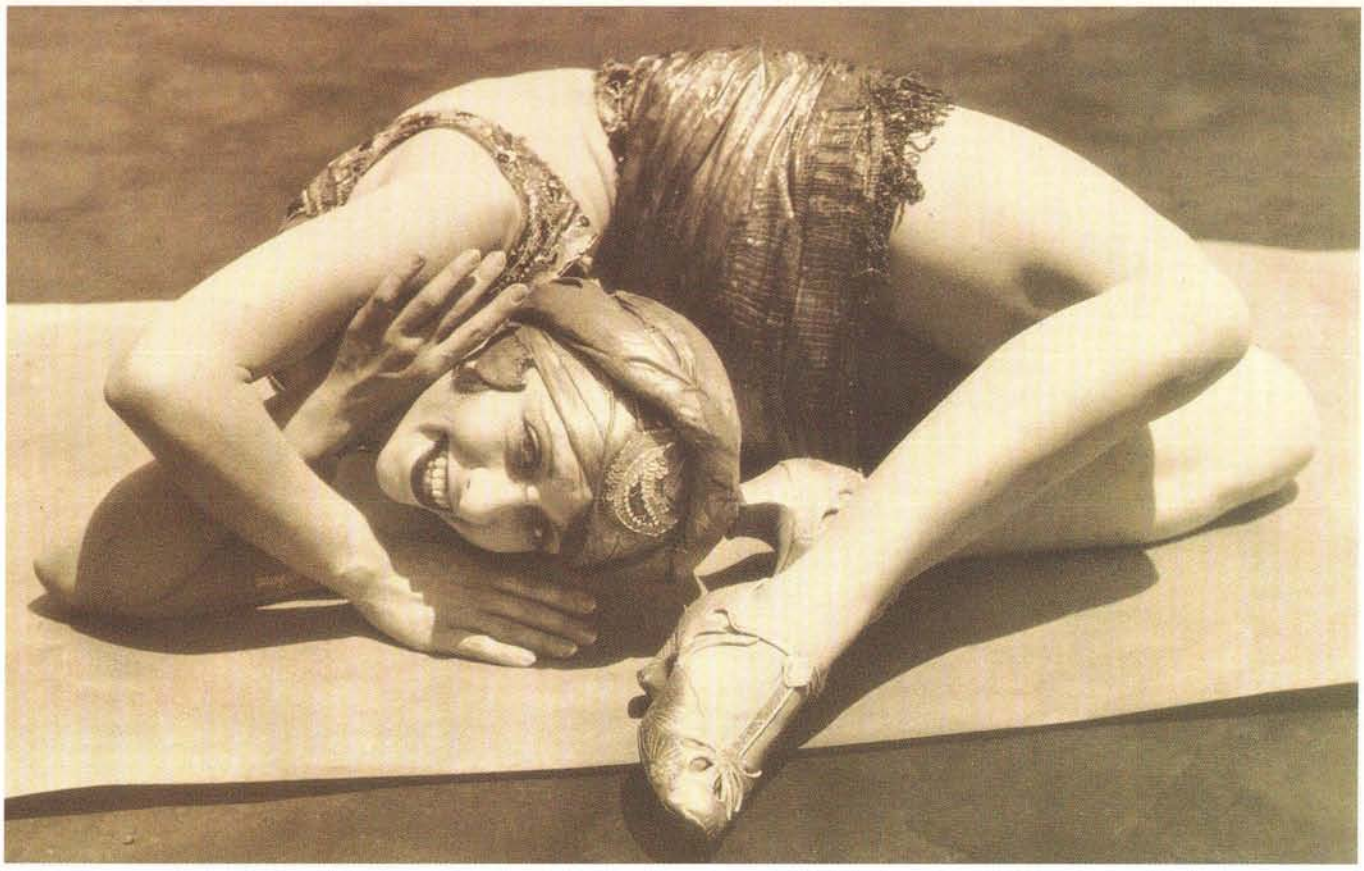
The original black-and-white engraving of the woman scanned in gray-scale mode (top); the scan in the process of being colorized (middle) with the arbitrary map (bottom).

to-black ratio. Using the sliders in the Color Balance window (in the Adjust submenu under the Image menu), she added red and yellow to the image. Then she brought up an arbitrary map—a grid with a diagonal line through it—which allowed her to manipulate the color interactively (by choosing Arbitrary from the Map submenu, under the Image menu). Choosing first the red, then the green, and finally the blue map, she began redrawing the diagonal line in each. As she drew, she could see the colors of the image change accordingly. She used the arbitrary map's Smooth option to make a more subtle transition from gray scale to color. Because the woman's face and hands were white, they were unaffected by the map. Fenster selected them with the magic wand, chose a color with the Color Picker, and used the Fill command to fill them with that color.

The padlocks and keys were actual objects Fenster scanned (the lock and key were scanned together). Because the objects were not flat, after she placed them on the scanner and closed the cover, she draped a black cloth over the lid to block out any light that might leak through. This minimized shadows in the

continues

The original scanned padlock and key (top). The padlock with the first pattern stretched over and pasted into it (bottom left); the padlock with the second pattern pasted over the first, making the first pattern into a mask that to varying degrees filters out parts of the second pattern (bottom right).



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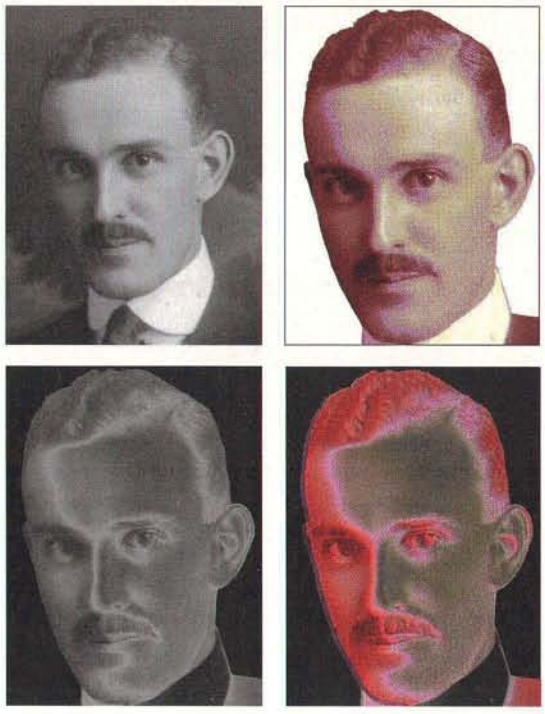
scanned image. After scanning the lock and key, she separated them into two files and duplicated the lock using the Duplicate command in the Calculate submenu (Image menu), keeping one as a template for later use. Using the magic wand with a tolerance of 1, she selected the white background around the lock and used the Inverse command (to make the lock the selected object). She copied a small rectangular section of a pattern she had previously created and pasted it into the lock using the Paste Into command. Then she stretched the pattern using the Scale command (in the Effects submenu under the Image menu) to cover the entire lock. Now the pattern covered the lock but not the background. Then she used the Paste Controls command set at 80 percent Opacity and Fuzziness set at 23 so the detail on the lock showed through and the fuzziness smoothed it out. Using a different pattern, she repeated the process with the second lock. For the third lock, she selected the object and saved that selection as a new RGB channel, which made the background black and the lock white. She then used the Load Selection command to load the selection back onto itself in the new channel. After copying another pattern, using Paste Into, and stretching the pattern to cover the lock, she went back to the original composite channel and loaded the selection (the new channel) into it. Then she took a completely different pattern, copied it, pasted it into, and stretched it over the lock. In effect, the original pattern became a mask, allowing the newly pasted pattern to show through it in varying degrees: completely in the white areas, progressively less in the darker areas, and not at all in the black areas. On the keys, she used the same technique she had used to texturize the first two locks.



The original photo of the man scanned in gray-scale mode (top left); after the background was clipped out and the man was colorized with the arbitrary map (top right); the man inverted and solarized (bottom left); the man with neon edges along shadow lines created by slightly offsetting the colorized image from the gray-scale one underneath (bottom right).

For the moon, she scanned a black-and-white photo in gray-scale mode, then used the paintbrush with the Color Only option at 40 percent opacity to colorize only the gray pixels, making them blue.

For the head of the man (another black-and-white photo scanned in gray-scale mode), Fenster cut away the background by outlining his head with the pen tool, making the head a selection, choosing Inverse to select the background, and deleting it. After switching to RGB mode, she used Color Balance to add overall color tone, then created another arbitrary map, through which she added yellow and lavender tones in the shadow and highlight areas. Going back to the original gray-scale image, she inverted it and changed it to RGB mode, then applied the Solarize filter (in the Stylize submenu under the Filter menu). In the colorized image, she selected the background, selected Inverse (Select menu), then copied and pasted the head using Paste Controls at 100 percent opacity with the Color Only option so the shadows and highlights of the gray-scale image underneath would show through. Then to create a neon edge effect, she offset the floating selection by dragging it slightly away from the underlying image.

The hand was the last element to be added. Fenster used the same process she'd used to colorize the locks, except that she pasted in a pattern using the Color Only option (of the Paste Controls command) so that only the gray pixels would be changed, leaving the black lines and the white areas unaffected. This technique preserved the engraved effect of the original image while subtly colorizing it.

The illustration, whose file size was 17MB, took Fenster approximately 25 hours to complete. ■

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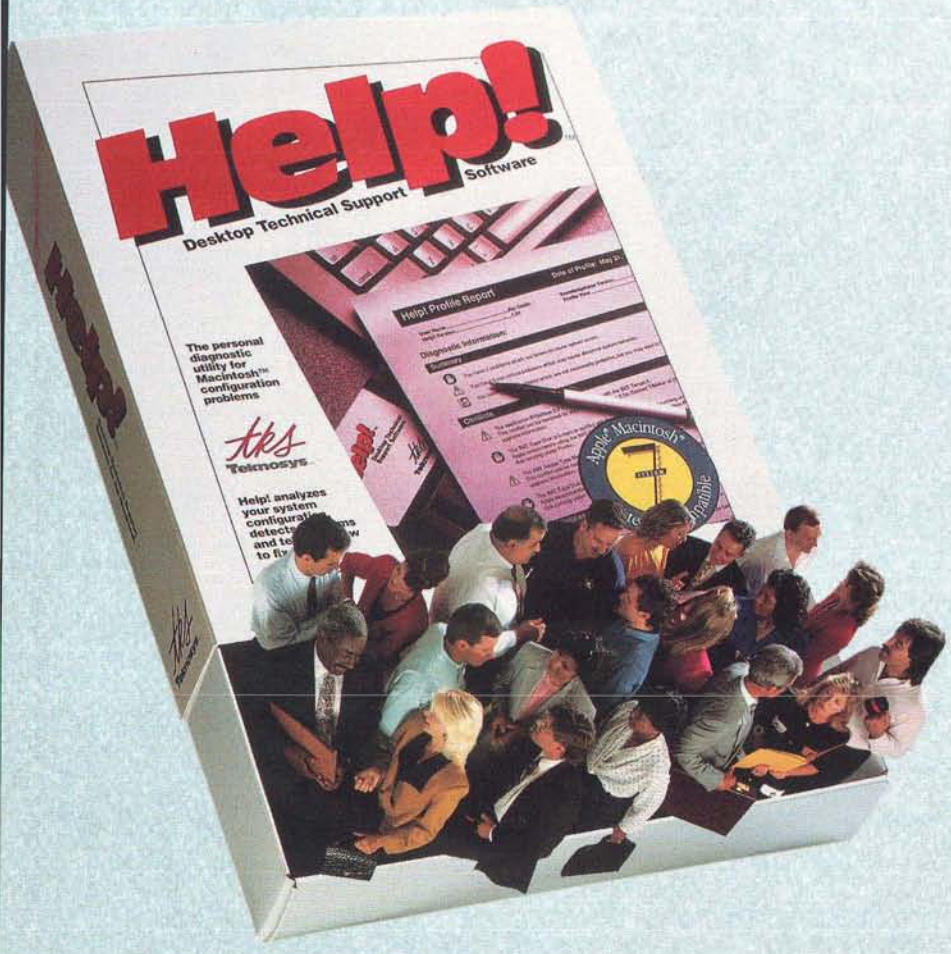

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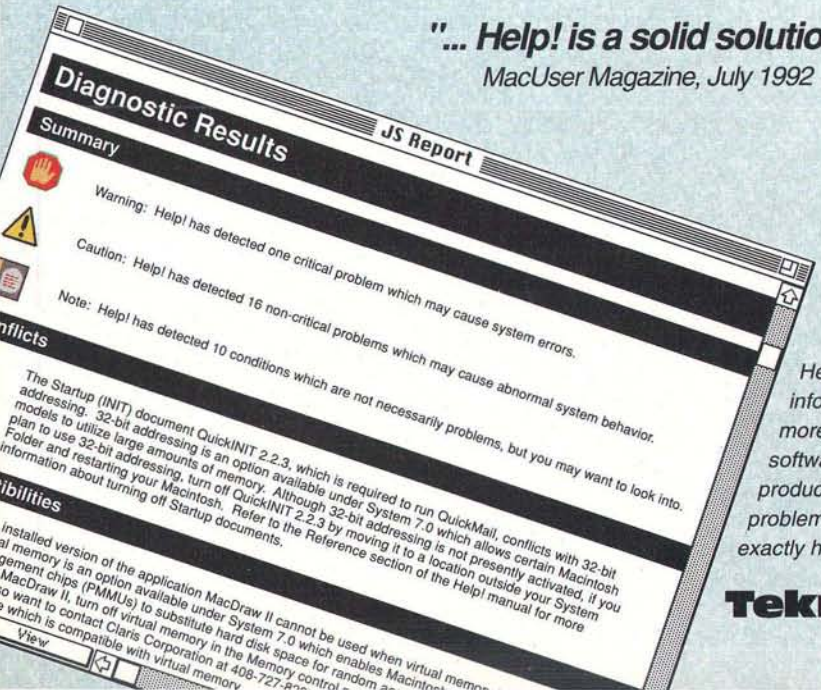

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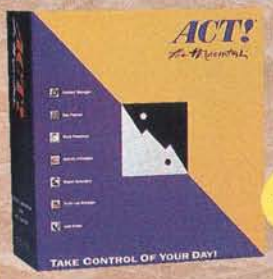

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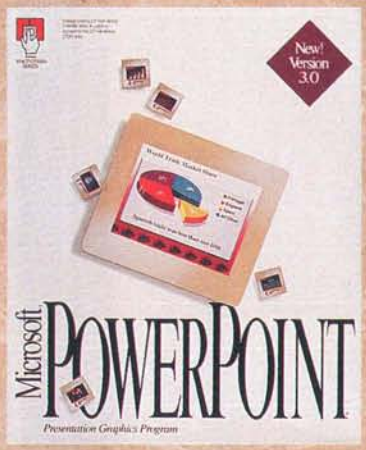
ACT! for the Mac keeps up-to-the-minute files for all your contacts—with fields that can be customized, date-stamped notes and a comprehensive history log. The activity scheduler, with graphical day, week and month views, lets you schedule unlimited calls, meetings and to-do's. The full-featured WYSIWYG word processor with spell checker is ideal for producing professional correspondence. Contact Software **#06231**

VERSION UPGRADE $124



Microsoft Word 5.1

Microsoft Word provides depth of function and ease-of-use like no other word processor on the market today. The all new version 5.1 makes it even easier than ever to apply the full power of Word to the chores you do every day. Microsoft **#00596** ❼✓

#04898 Microsoft Word 5.1 ..... $294

VERSION UPGRADE $88

Microsoft Excel 4.0

The leading spreadsheet for the Macintosh just got even better. Microsoft Excel version 4.0 for the Apple Macintosh was designed with you in mind. It gives you access to more powerful features and makes everyday spreadsheet tasks easier than you ever dreamed possible. Microsoft **#04545**

- **New customizable toolbars give you instant access to the right set of tools for your work.**
- **Autosum™ lets you automatically sum rows of numbers with a click on the toolbar.**
- **Wizards are interactive outline tutorials that walk you through tasks, including chart creation, to give you instant access to the most common options.**

#00227 Excel 4.0 ..... $294

$114

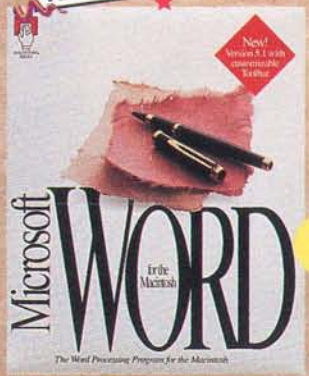
Special Features

- **Scan in pictures and legal documents for a complete archive.**
- **Identifies confusing family relationships—like fourth cousin, twice removed.**
- **Create large, detailed descendant and pedigree tree charts.**

Reunion

Bring your family together with Reunion genealogy software. Enter your family information and automatically create graphic tree charts, family histories, birthday calendars, mailing lists and more. Scan in pictures and legal documents for a complete archive. Reunion even identifies confusing family relationships—like fourth cousin, twice removed. Awarded 4-1/2 mice from *MacUser*. Leister Productions **#05984**

NEW VERSION



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- **TrueType**

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Microsoft PowerPoint 3.0

Now you don't have to rely on outside sources to produce slides and overheads for your presentations. Microsoft PowerPoint for the Macintosh allows you to make slides and overheads directly on your Mac! Microsoft **#01220** ❼✓

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Hammer 1000FMF

With an average seek time of just 9.5ms the handsome Hammer1000FMF (Fast Media Format) delivers incomparable capacity, performance and legendary Hammer reliability. Like all Hammer drives, the 1000FMF comes in a rugged aluminum enclosure, uses only the finest components and construction techniques available and includes an auto-switching universal power supply for plug-and-play operation anywhere in the world. FWB #05422 ❼

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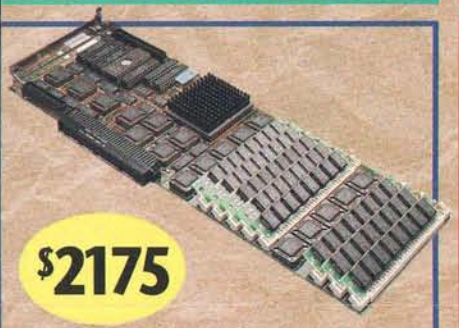
The SuperMatch 20•T is an exceptionally versatile display for color professionals who want a desktop view that's right for every project. With easy customization controls, Trinitron technology, and exceptional color rendition, SuperMatch 20•T is right for every work environment. SuperMac #06234

#05123 SuperMatch 17" Multimode Color Monitor $1244



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Radius Rocket 33

Blast your II, IIx, IIcx or IIci computer into another dimension of performance with the Radius Rocket 33 accelerator. This awesome 33MHz Motorola 68040 power-house increases the processing speed of the original Mac II by up to eight times, making it even faster than the Quadra 700 in most cases—and it costs less than Apple's own upgrade! Radius #05250

Shift Your Productivity into High Gear with NEC

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MultiSync 3FGx

Some products demand to be described in superlatives. The new FG series of MultiSync monitors from NEC fall into that category. They feature the best color accuracy in their class. Completely redesigned from the inside out, they give your Mac brighter, sharper, more accurate images. The 3FGx's flat (perfectly flat) 15" screen is packed with state-of-the-art extras like the new NEC FullScan capabilities which allow you to see up to 36% more active screen display. And it turns out the fastest refresh rate in the business which means crisper, deeper, truer colors than you've ever seen before. NEC #07144 ❼

#07143 4FG MultiSync 15" Monitor ❼ $778
#00578 FG8x Interface Card ❼ $718
#04985 FG24x Interface Card ❼ $1284

M95FX Printer w/ PostScript Plain Paper Fax

$2075

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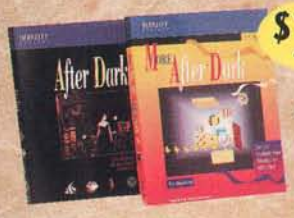
StuffIt SpaceSaver invisibly compresses your files and folders so quickly and quietly you may never notice it's there. At just about the speed of your hard disk, StuffIt SpaceSaver can compress and expand on-demand (as you specify) or automatically (while your Mac is sitting idle). Most importantly, you don't have to change the way you work on your Mac. Double-click a file in the finder. Open a document from an application. Everything works the way it usually does. But with one difference—your files take up less space!
Aladdin Systems #05828



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After Dark & More After Dark—Bundle

After Dark, one of the finest screen saver collections available for the Mac, comes with over 30 displays including Flying Toasters and Fish! The package also includes sound, password protection and message displays. More After Dark comes with over 25 incredible new displays for After Dark. It features context winners Mowin' Man, Tunnel, GraphStat and beautiful new Fish! Crazy Kittens and Lunatic Fringe game modules (requires After Dark).
Berkeley Systems #04046 ✓

#04053 More After Dark Vol.1 ..... $23

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Keep track of your life and the people in it with DateBook, the Macintosh personal organizer that enables you to enter and keep track of appointments, schedules and things-to-do. TouchBASE is a database which keeps track of personal and business contacts. It remains handy all the time—no matter what application you're using.
After Hours Software #06167

#05209 DateBook v 1.5 ✓ $78 • #03908 TouchBASE ✓ $78

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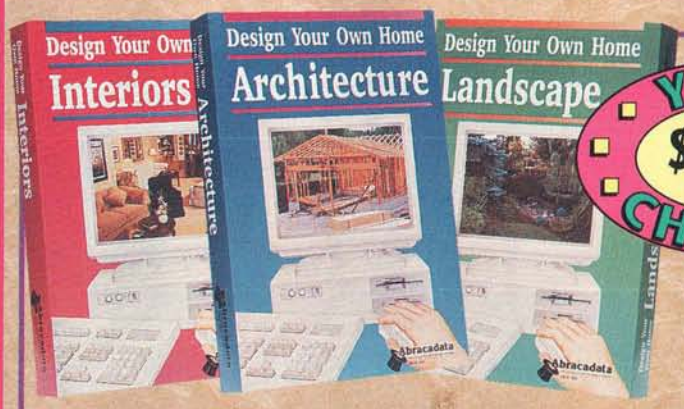

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Interiors makes it easy to plan the decor of your home or office. Use the drawing tools and supplied patterns to bring your interiors to life! View the room from the top or from four different automatic side-view perspectives.Abracadata #03611 ✓

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Landscape gives you a variety of drawing tools and patterns to help you plan. Use the built-in object library or draw your own trees, shrubs, etc. then automatically see your design from four different side-view perspectives. Prints plans and plant shopping lists.
Abracadata #03610 ✓

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With Architecture you'll draw your own floor plans, side view building plans and design structural details. The program has a unique stud repeater tool which speeds drawing and aids in lumber estimates. The overlay feature allows layering of details such as electrical or plumbing schematics and multiple floors.
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Sprout!

Sprout! is a complete computer planning tool for vegetable gardeners. With it you can easily produce a graphic, scalable garden plan with correct plant and row spacing. In addition, Sprout! contains a fully editable database of vegetables for 7 climate regions. Print out garden layouts, calendars, shopping lists and reports. Abracadata #05085 ✓

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Mighty Draw

Mighty Draw is the affordable, general-purpose, object-oriented drawing program that allows you to create pie charts, column charts, bar charts, flow charts, organizational charts, graphs, electronic schematics, network diagrams, fliers, news letters, greeting cards, advertisements, logos, clip art and much more. Mighty Draw comes with symbols for flow charts, electrical schematics and more. You can even add symbols from other programs.
Abracadata #06162 ✓

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Gryphon #05925

$194

Aldus IntelliDraw

New from Aldus, IntelliDraw is an exciting new type of drawing program that gives you an easy new way to visually experiment, refine and draw your ideas. Full text and drawing options provide the flexibility you need. Aldus #05481 ❓✓

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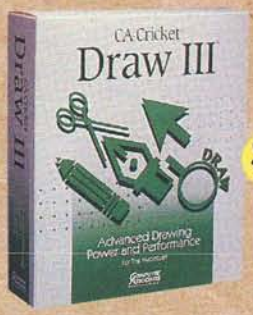
Fetch makes browsing, finding and retrieving files fast, easy and efficient.
Aldus #06319 ❓✓



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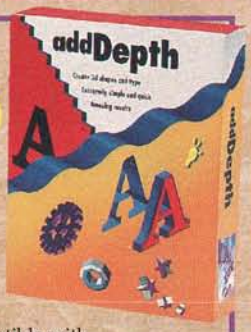
CA-Cricket Draw III 1.1

CA-Cricket Draw is a fully-featured drawing program for producing professional-quality graphics on the Mac. It features high-end drawing power with its Bezier-based tool palette, flexible color interface and more.
Computer Associates #04414 ❓✓



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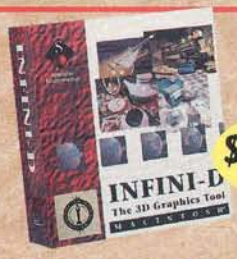
addDepth

Create attention-grabbing effects including type and illustrations with addDepth. It's compatible with your drawing software and it's fast and easy. Enter text or objects directly or import PostScript-compatible clip art or drawings created in drawing software such as Adobe Illustrator or Aldus FreeHand. Next, add depth and perspective automatically with addDepth's virtual trackball and perspective tool. Print from addDepth or export fully editable line art back into your Macintosh document. Ray Dream, Inc. #05965



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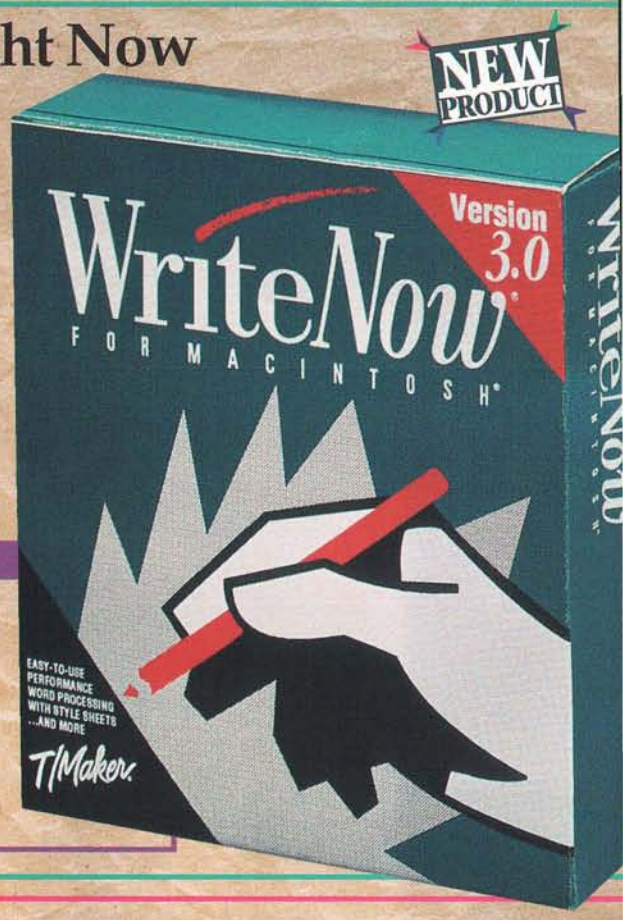

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- Highest rating for Ease of Use, Speed, Value and Documentation, *Government Computer News*
- Highest overall rating, *Software Digest*, 1990
- Editors' Choice Award, *Computer Reseller News*, 1990
- Editors' Choice Award, Best New Word Processor, *MacUser*, 1989

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05764	Mini DIN 8/DB 25	6Ft	Mac+/SE/II to Imagewriter I printer cable	1
05765	Mini DIN 8/mini DIN 8	6Ft	Mac+/SE/II to Imagewriter II/LQ (letter quality) AP modem	1
05766	Mini DIN 8/mini DIN 8	10Ft	Mac+/SE/II to Imagewriter II printer cable	1
05767	Mini DIN 8/DB 25	6Ft	Mac+/SE/II to Hayes-compatible modem	1
05768	Mini DIN 8/DB 25	10Ft	Mac+/SE/II to Hayes-compatible modem	1
05769	DB 25/Centronics 50	2Ft	Mac+/SE/II SCSI system cable	1
05770	2:1 mini DIN 8 switch box		Peripheral sharing device 2 to 1 switch box	2
05771	4:1 mini DIN 8 switch box		Peripheral sharing device 4 to 1 switch box	3
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#05909 PowerBook/Fax Case, Leather: 13.75"x2.5"x13.75" ... $128
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$138

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The Applied Engineering External Full-Cycle Charger not only charges the PowerBook 140/180 ni-cad battery but optimizes full performance and long life by giving you the option to discharge the battery completely before the charging cycle begins. Applied Engineering #05354

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Kensington NoteBook KeyPad

The Kensington NoteBook KeyPad gives you the flexibility and features of a full keyboard when you use your Macintosh PowerBook. Its compact, sleek design is perfect for travel with your PowerBook or any other ADB device. This module gives you function and arrow key control, as well as the standard mathematical and number keys found on an extended keyboard. Kensington #05177

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PowerModem 24/96 SR Internal

Make your Mac work harder for you with the unbelievably affordable PSI PowerModem. The PowerModem is not only an internal send/receive fax modem, it's also a 2400bps Hayes-compatible data modem. The Fax is Group III compatible, sends at a full 9600bps and receives transmissions at 4800bps. PowerModem will dramatically improve your PowerBook's performance—while PowerModem performs in the background, you can continue to work! PSI #04948

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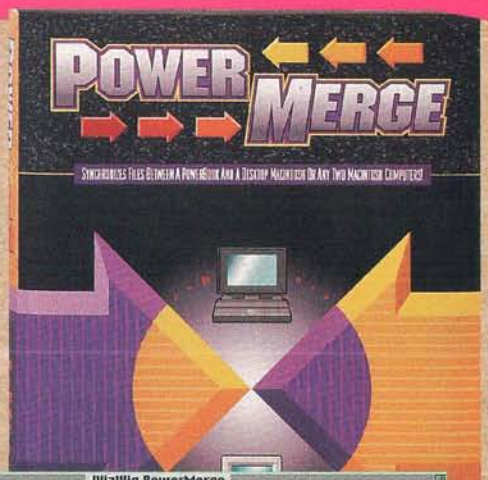
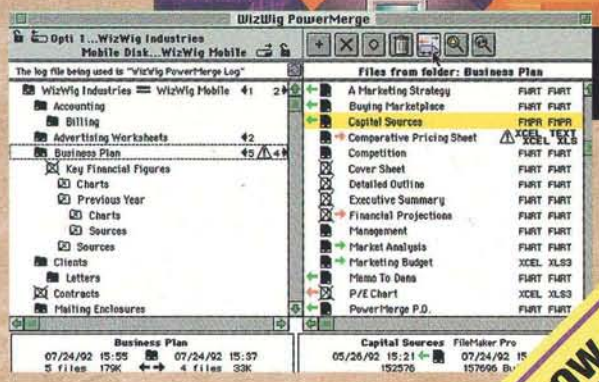
PowerMerge



Keep the files on your desktop Mac in sync with those on your PowerBook with PowerMerge. It identifies which computer has the most recent version of each file, updates the older versions with the newer ones and adds any new files and folders that have been created. Just select which files, folders or disks you want to update (or ignore), and PowerMerge does the updating for you automatically! It's fully System 6 and 7 compatible. Synchronizes any two Macs by direct link, network access or removable media. #05690



☛ Precise

PowerMerge gives you precise control over which files and folders will be maintained. It alerts you if files have changed on both computers since the previous update so you can decide which is t he correct version to save.

☛ Secure

PowerMerge gives you the option to preview the updating process before it begins, so you remain in control. The program also warns you if a file of the same name has been created on both Macs and it gives you the option to change one of the file names.

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Newton Rising

BY STEVEN LEVY

THE NEWTON SLIDE SHOWS have been humming for almost a year now. The magazine covers—*Newsweek*, *Byte*, and yes, *Macworld*—have all been printed. The term *PDA*—short for personal digital assistant—has wedged its way into our vocabularies. Thanks to Apple's early disclosure, we all know that Newton is Apple's bold new venture into Jetson-tech, where portable smart devices will perform routine chores for us.

Newton definitely fires the imagination. But without a real product to ground our preconceptions, it's difficult to nail down what Newton really is. Apple only confuses things by attempting to explain what Newton is not. *Newton is not a product*, we are told. *Newton is not a product line.* Uh, come again? *Newton is a set of software and hardware technologies that enable multiple product lines.* Oh.

You know those comedians like Jerry Seinfeld who always say, "Ever have the problem where . . . " and then describe a mundane dilemma you perpetually suffer but never really think about? Well, Newton is sort of a Seinfeld machine. For every stupid problem you have in capturing, organizing, and communicating your routine information transactions, a Newton device will solve your problem. If Apple has its way, Newton will put a thousand stand-up comics on the breadline.

But, as far as I can make out, none of those devices alone will be Newton. Newton will reside in a collection of common behaviors. These include the ability to recognize and digitize scrawled input and sketches, the intelligence to decipher and execute complex requests based on simple (or even implied) commands, and the vivaciousness to communicate with other Newton devices and the world at large. The interface, a button-laden, HyperCard-like system, will be consistent and transparent, whether the device is a personal organizer that performs the duty of a private secretary; a smart telephone that automatically orders a pepperoni pizza and pays for it at the touch of a button; or a student's desk mate that reads a teacher's notes from a Newton chalkboard and inputs answers to a surprise quiz.

Will Apple manufacture these products? Not necessarily. The first product, for instance, presumably the ultimate electronic Filofax, will be manufactured by Sharp. (Originally Apple said the product would be shipping just about now. The date is now "late 1993.") Apple has recruited other strategic partners, drawing on their expertise in communications and consumer electronics. The idea is to increase Apple's ability to put its stamp on what it calls "revolutionary, mobile products." The ultimate prize is leadership in a new industry that promises to become bigger than the personal computer industry itself.

This much has been discussed ad infinitum by horizon-scanners and infopundits. But when I finally got around to attending a Newton briefing myself, a dog-and-pony show run by Newton's product marketing manager, Michael Tchao, I sensed a story not told. The videos showed us that Newton was real—we listened to executives from strategic allies like Pac Bell and Random House, and learned how common folk would use Newtons as smart assistants. But when it came to product, all we were shown was a sleek-looking hunk of plastic with no circuitry or software. (This was the cover model for all those magazines.) Then we were warned against making the assumption that the first Newton product would look like this—it might, or it might not.

How did this happen? Why is Apple going so far out on a limb? The reasons have as much to do with Apple as with the bold new technology itself.

Big Newton

THOUGH NEWTON IS NOT A product, exactly, it began as an attempt to design one. In 1988 Jean-Louis Gassée began a project he hoped would yield the ultimate in mobile computers—something in the spirit of Alan Kay's Dynabook, John Sculley's Knowledge Navigator, and Captain Kirk's personal navigator. (Running the project for Gassée was his lieutenant, Steve Sakoman.) "The charter was to go out and make the next great information device," says Michael Tchao. "It would be the anything-you-wanted-to-carry-around computer," adds Steve Capps, a key engineer on the project.

How a "little hack" became the key to Apple's future

Capps, known to Mac-trivia buffs as one of the architects of the original Finder, had been cajoled to join the team a few months after its formation. Already on board were the likes of original Mac team member Jerome Kunen and Macintosh II software wizard Ernie Beernink. The hardware guy was Mike Culvert, a prodigy—"stolen out of the cradle," says Capps. They set about to design a silicon movable feast—a fire-breathing slab about the size of an issue of *Vogue*, with a screen the size of the original Mac. There would be a stylus to input text, and the machine would be capable of recognizing handwriting. There would be the ability to communicate without wires. There would be two microprocessors, and it would run faster than a Quadra.

From the start, it was a pet project. "We've always been given a blank check to be separate," says Capps, who had been through something similar when working on the original Mac project. But he didn't want a repeat of the pressures of that experience. "With Macintosh, Apple was betting the company—it was, 'If you don't pull it off, we die,' " he explains. With Newton, "I always said 'Just make sure it's not a bet-your-company proposition.' Apple has its desktop business, so it's not like we won't be here [if Newton fails]. We have that freedom."

But freedom unchecked leads to messiness. As the proposed computer took on more features, it became so powerful, in fact, that some on the team began to think they were hatching a costly monster.

The engineers begged Apple to assign a marketing person to the team. Though on the face of it this seems strange—why would wireheads want a bottom-line type around?—it makes sense. A smart marketing person, with an awareness of what people fantasize about and what they're willing to pay for, could help focus the product. There was plenty of informa-

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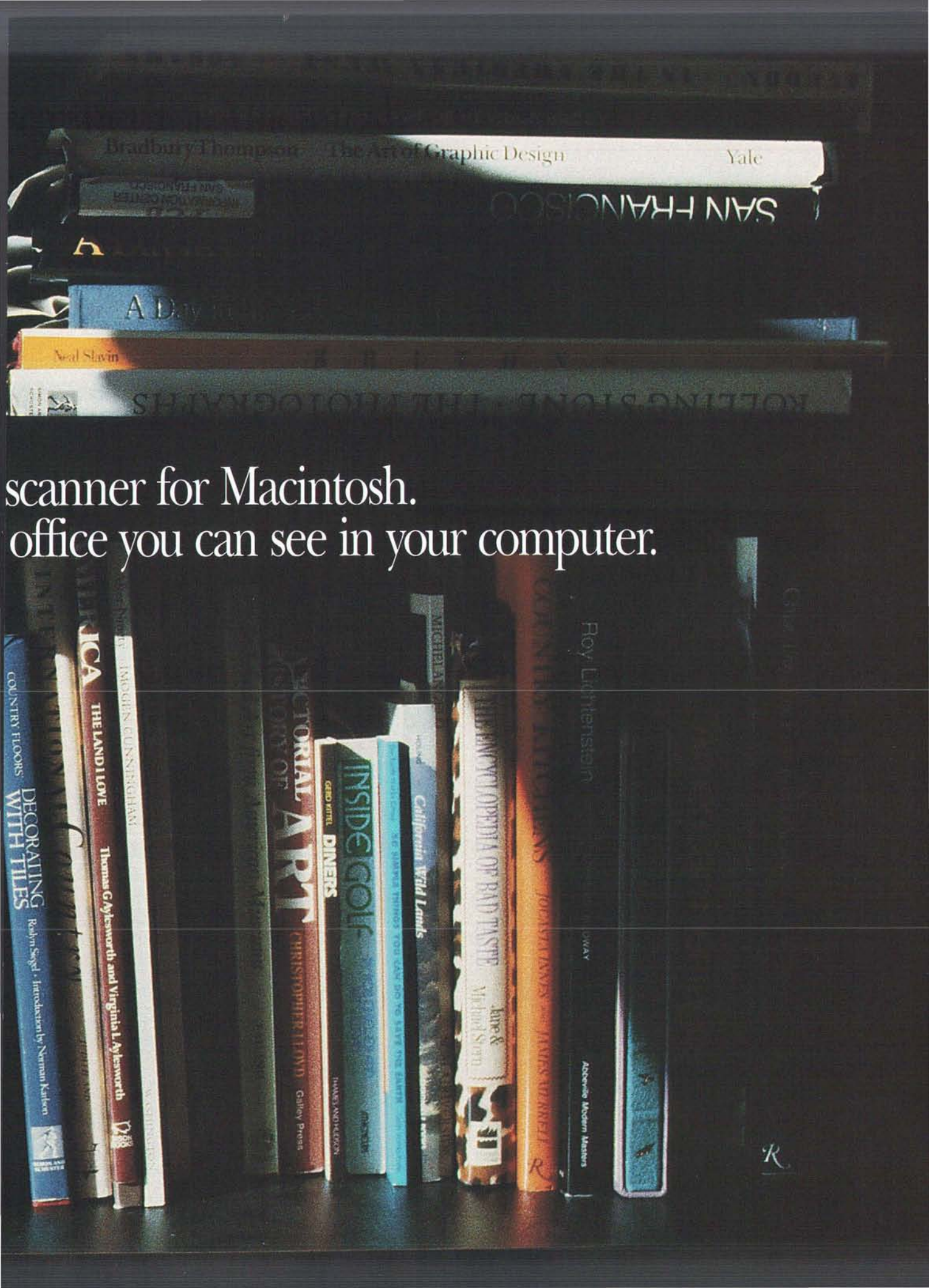

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tion to sift through—Apple had done zillions of user studies about the way people handle information. There were analyses of everything from telephones to chalkboards to Post-it notes. At one point Apple even had an anthropologist trailing knowledge workers, jotting down how they integrated stray bits of data into their daily lives. Still, engineers being engineers, the driving impulse on the project seemed to be Go Bonkers.

The Little Hack That Could

THE TURNING POINT CAME IN 1990, when multiple events conspired to irrevocably set the course of Newton. Gassée, whose technology-as-sex-object mentality had encouraged the engineers to keep raising the processing ante, had left Apple, and Sakoman went with him. Michael Tchao arrived to be the marketing person. John Sculley put the project under the control of Apple vice president Larry Tesler, a heavy hitter on the executive team. The new regime agreed that the project was too big, and the engineers began scaling down to something that might cost half as much.

But Capps and Tchao realized that the very concept of Newton was still off. The problem was that they were building a *computer*. "As a computer designer you know all about computers, and you look at all sorts of tasks, thinking, This has to be *better* than the best computers," explains Tchao. But if Newton's charter was to deliver smart information-processing on the run, it was wretched excess to compete with desktop machines in word processing and accounting. "You can't do it!" says Capps. "You can't run Excel 9.0!"

Tchao suggested that they focus on what they *could* do. Capps had the answer: "What is Apple good at? Making sexy user interfaces!" That sparked the idea to make a software core the essence of Newton. This required a major break in procedure. Newton could not be a Macintosh. It had to live in another realm. "Can you imagine if you came out and said, 'This is a Macintosh computer and it doesn't do windows?' " asks Capps. Instead, the new system, which Capps called "a little hack," would take a little bit of Mac and put it in a hand-held device. It would be an omnivore, scooping up the best artifacts of familiar information processing—faxes, phones, Post-it notes, paging systems, TV remotes—and integrating the whole mess into a single elegant system.

This downscaling was in a weird sense an expansion of the project. Though the device itself could be small, there could be any number of them, dedicated to different tasks. That thing called Newton would rest in the architecture, the recognition, the intelligence, an ensemble that would be the constant in all the products. Like the Mac Operating System, this trinity would be the personality behind all Newton devices—the collective soul of an entire population of new machines. Hard to describe? Maybe. But easy to use. And useful. This new view of Newton, "the little hack," prevailed. Newton is now a juggernaut, an entire division of Apple. "It's still a hack," insists Capps, "but Apple can't do anything small."

When you think about it, the Newton venture is a stunning departure for Apple. "It's a new category, between the personal computer and the consumer electronics world," says Tchao. At the center of Newton devices will be Apple software, handling core tasks such as recognizing handwriting, translating vague natural-language commands into concrete instructions, and making educated guesses as to what users are asking for. But Apple won't be making all the hardware; this will generally be done by selected partners such as Sharp, phone companies, and toymakers.

"It's really a partnership; [Apple] can't do it alone," explains Susan Schuman, manager of Newton's communications products. "You can't say the intelligence rests in the device, the network, or the information—it's a different business for everybody." The killer apps that drive Newton will not be tools like spreadsheets or word processors, but customized data—content—fed into one's Newton device by credit card–size data disks or wireless communication channels. The applications could be things like phone books or travel guides.

The Bottom Line

WHICH BRINGS US TO THE *WHY* PART of the equation. Why would Apple devote so many resources to an alien business? The answer lies in the fact that the computing world, particularly Apple, has changed drastically since 1987, when the Newton group was originally formed. The writing is on the wall, and the medium is liquid crystal: the desktop Macintosh has peaked. Apple's recent impressive revenue gains are the result of monster sales of PowerBooks. Besides, the popularity of Microsoft Windows has helped assure that all desktop computers essentially work the same; the fact that Macintosh does it more elegantly is small consolation. And since Apple is betting that the desktop computer of the future will be the PowerPC—developed jointly with former blood rival IBM—it is assured that Apple computers in the future will look no different from anyone else's.

This puts Apple in a strange position. The company mission is to produce distinctive products that, to quote Gassée, "smell like infinity." Five years from now, all desktop computers will be commodities, and they'll smell like manual typewriters rescued from a pawnshop shelf. In order to recapture Gassée's cosmological fragrance, Apple has to focus on a new area, big-time, and design excitement into it. Thus Newton is Apple's attempt to do with the operating system of mobile computers what it did with the operating system of desktop computers—develop the technology of tomorrow and convince people that it's the technology for today.

This is why, when Capps and Tchao proposed Newton's fateful downsizing, Apple seized the moment—even if it meant dramatically changing the way it did business. This is why the project, without a product to sell or even preview, was announced last year with such fanfare. The Macintosh, as much as we love it, is yesterday's news. Newton is tomorrow.

There are plenty of obstacles in Newton's path. Apple isn't the only one to realize that the company that lays the rails for a mobile computing architecture gets to claim the whole train set—this is the dream of a whole range of pen-based start-ups. And you can't say the word *standard* on planet Earth without raising the attention of Bill Gates and company—Microsoft has recently announced plans for its own Newton-like operating system.

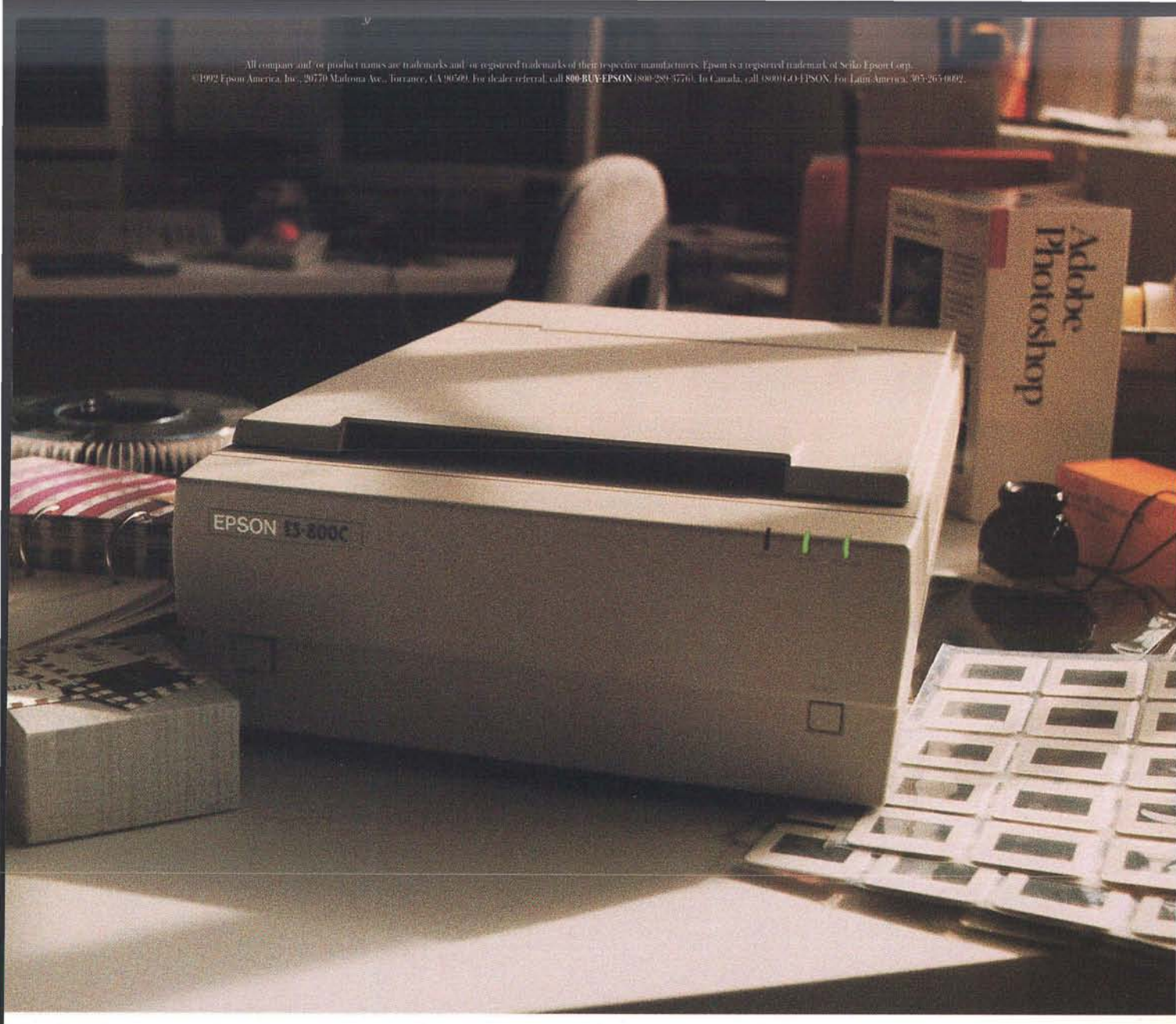
It's far from assured that the development of new communications technologies will be rapid and organized, particularly in the wireless realm so essential to the fulfillment of the Newton vision.

And then there's the danger that the first Newton device, by freezing Apple's broad imaginative vision into a first-generation product, is bound to disappoint—especially since Newton doesn't get really interesting until many Newtons exist to talk to each other. "We're very concerned about that," admits Michael Tchao. "A single walkie-talkie is a lonely place, so we intend to make it valuable right out of the box." Even if Newton doesn't take off, Tchao says, "Apple can afford to be patient" and wait until other Newton devices come online.

Patience may be required, but the pressure for Newton to succeed is beginning to build already. I predict crescendo levels. Apple may not be betting the company here—but enough of its chips are on the table to identify Newton as its heftiest bet since Macintosh.

It's a heavy load for "a little hack" to bear. But Newton is one heavy hack. **m**

STEVEN LEVY's most recent book is *Artificial Life: The Quest for a New Creation* (Pantheon, 1992).



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Tips for Healthier Computing

BY DEBORAH BRANSCUM

FIRST, THE BAD NEWS. THE number of workplace injuries associated with working on computers continues to rise. Moreover, several recent studies suggest there's reason to be concerned about the possible health effects of exposure to extremely-low-frequency (ELF) electromagnetic fields (EMF). The good news is that the risk of keyboard-related injuries can be minimized by taking frequent breaks from typing and following other simple guidelines. And there's no need to panic over sitting in front of a monitor—any health risk from ELF emissions is quite small and can be lowered further by sitting at arm's length from your computer.

Workplace Injuries

CUMULATIVE TRAUMA DISORDERS (CTDs), also called repetitive strain injuries, are the most clear and present health threat to computer users. These injuries of the hands, wrists, arms, shoulders, and neck—associated with repetition, force, and awkward posture—afflict a growing number of office workers. (Some researchers believe CTDs are related to job dissatisfaction and work load as well.) And CTDs are not limited to white-collar workers—they've existed among factory workers, musicians, and athletes for years.

Last fall the National Institute of Occupational Safety and Health (NIOSH) announced the results of a two-year survey of nearly 1000 employees at the *Los Angeles Times*. NIOSH medical officer Dr. Bruce Bernard said that about 40 percent of the employees reported pain while typing; a subsequent one-day medical examination found evidence of injuries in more than half those cases. And like several earlier studies, this survey found that the more time employees used a keyboard, the greater the risk of injury.

"A lot of our recommendations try to deal with work-rest cycles," says Bernard. "There have been some studies that show people won't take breaks and will only get up when they start to feel bad. That's too late." The *Los Angeles Times* has instituted an electronic message system to remind people to take breaks. Most experts I've spoken to recommend breaking each hour or two of typing with a 15-minute period of different activity, but even brief breaks are a good idea, says Bernard.

"Get up from the computer on a regular basis and do something else. If you need to, put a timer on your computer to do that," says Dr. David Rempel, an assistant professor of medicine at the University of California, San Francisco. Another expert, Dr. Barbara Silverstein, told the *New York Times* that a national commission in Japan limits the time workers can spend at keyboards and has set mandatory rest periods, resulting in fewer injuries. Taking rest breaks, in other words, is the single most important thing computer users can do to stay healthy.

How you work is just as important as what you work with. "I try to make the point that ergonomics is not just the keyboard you buy but also how you use it," says Dr. Thomas Armstrong, an ergonomics specialist at the University of Michigan at Ann Arbor. In addition to breaks, here are some other common-sense precautions.

- Keep your keyboard low and your wrists in a neutral position, parallel to the floor, as you type.
- The top of the display should be at eye level. (If the display is too low, just pop a book or two under it.)
- Adjust your chair, if possible, to fit your height, so that your feet are flat on the floor. (If your chair is too tall and can't be adjusted, try resting your feet on a phone book.)
- At least one study suggests full-back support is helpful for keyboarding, along with an erect sitting posture. So sit up straight, for more comfortable computing.

No Magic Solution

"THERE'S THIS GROPING FOR a magic answer," says Rempel, alluding to the slew of so-called ergonomic products on the market and in development. The problem is that there is no magic solution for preventing CTDs, although plenty of companies claim to market ergonomic products that prevent injuries. And more products are on the way. "I get two calls a day from companies that would like me to look at a product and give it my blessing or give it an endorsement," says Rempel, who has nixed product endorsements to date. His advice? "Buyer beware."

Sit back from your computer—and take plenty of breaks

Most of this stuff simply hasn't been tested sufficiently to know if it works. Because CTDs involve many factors, simply changing one aspect of a chair or mouse or keyboard or display may not solve a given problem, and could cause others. Of course, innovative products do exist to make computing more comfortable, and users deserve many more choices when it comes to keyboards and other computer devices (see *Conspicuous Consumer*, August 1991). Just remember that comfort is highly subjective; don't buy an expensive "ergonomic" device without a money-back guarantee.

Lawsuit City

AT LEAST 19 PRODUCT-LIABILITY LAWsuits have been filed nationwide by users who claim they were injured by working on their computers. Apple is named in at least one suit, and IBM in at least two. (The rest of the suits are directed at computer workstation manufacturers such as Atex, Wang, and Computer Consoles.) Apple denies any liability and is vigorously defending itself against the $1.2 million suit, according to company spokeswoman Marianne Lettieri. But clearly Apple is concerned about the issue and it shows in the company's recent products. PowerBooks, for example, have a built-in wrist rest to help users maintain a neutral wrist position as they type.

Apple has also lobbied for additional federal research on CTDs and is supporting independent research with its own cold cash. Dr. Rempel directs an ergonomics lab at UCSF and is testing keyboard concepts with funding from Apple and other companies. Apple, along with Compaq and IBM, also founded the VDT Health Foundation, which is funding the Center for VDT and Health Research at Johns Hopkins University, an independent center headed by Dr.

continues

Ronald Gray and founded last fall to research both the ergonomics of computer use and the electromagnetic fields faced by computer users. One of the center's primary goals is expected to be supporting research on workplace measurements of EMF.

Magnetic Fields and Miscarriage

WHEN IT COMES TO ELECTROMAGnetic fields, "we're dealing with a situation that is still unclear, in my view," says Gray. "I think that what we need is first to step back and review what we've learned; identify what might be the problems, particularly in measurement; and then decide if we can resolve some of the outside concerns. I think it is worth doing because VDT use is just becoming a part of all our lives."

Two and a half years after *Macworld*'s July 1990 cover story on extremely-low-frequency EMFs and computer monitors, there's still no scientific consensus that these fields present a health risk. Some scientists dismiss the issue entirely. But the results of several recent Scandinavian studies imply that minimizing your exposure to these fields may be a good idea.

Early last year a team of Finnish scientists announced the results of a little-publicized study that measured the ELF magnetic fields faced by a group of pregnant workers. Dr. Maila Hietanen of the Helsinki Institute of Occupational Health found no correlation between miscarriage and the number of hours a woman worked in front of a video display terminal (VDT). She and her colleague did find a relationship between ELF and very-low-frequency magnetic fields and miscarriages, however. According to a report in the March/April 1992 issue of *VDT News*, "VDT operators who were exposed to extremely low frequency magnetic fields of greater than 9mG [milligauss] had a miscarriage risk close to three-and-a-half times greater than those who used VDTs with ELF exposures of less than 4mG. . . . Women exposed to 4–9mG ELF magnetic fields had nearly twice as many miscarriages as those exposed to less than 4mG." Hietanen's study compared 191 clerical workers who suffered miscarriages with 394 clerical workers who gave live birth between 1975 and 1985. Both Hietanen and her partner, Dr. Marja-Liisa Lindbohm, stress the need for their results to be confirmed. In the meantime, should a pregnant woman who uses a computer take any special precautions? Many studies have failed to turn up an association between working on computers and miscarriages, although plenty of studies link stress with health problems. So the most important precaution is not to get stressed out over using computers—there's simply no confirmed evidence that a problem exists.

That said, *VDT News* quotes Dr. Hietanen suggesting that those women who are concerned about electromagnetic fields buy a monitor that meets the Swedish MPR-II guidelines (liquid crystal displays are another option). Her partner, Lindbohm, has said, "When you use a VDT, it would be better to have the lowest possible magnetic field," according to *VDT News*.

Reducing Your Exposure

BUT YOU DON'T HAVE TO BUY A NEW monitor to reduce your exposure to ELF fields. The simplest way to limit your exposure is simply to sit back from your computer. Electromagnetic fields drop off sharply with distance; at 28 inches from the front of many monitors, people are exposed to negligible levels of magnetic fields. That's particularly true for monitors that meet the Swedish MPR-II guidelines and that are offered by many companies, including Apple, Nanao, NEC, Radius, RasterOps, and Sigma Designs. (See *Macworld*, March and September 1992, for monitor overviews that

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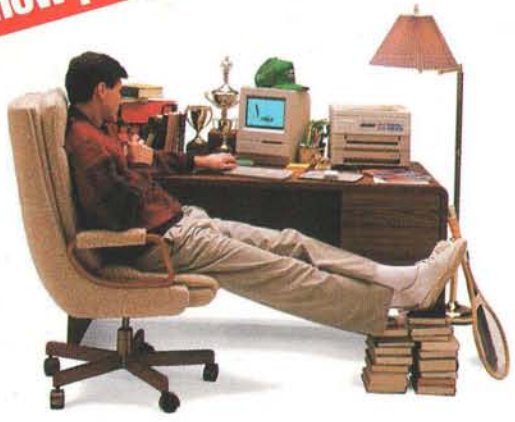

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If you do go shopping for a new monitor, keep in mind a few loopholes in the MPR-II testing requirements. Vendors are required to test their monitors at only one resolution. If you are buying a multiresolution monitor, ask the company at what resolution the monitor meets the MPR-II guidelines. Generally, the higher the resolution, the greater the electromagnetic fields. Ditto with brightness; the higher the brightness, the higher the fields. Vendors test at midpoint brightness, but that's not necessarily what users are exposed to. A quick look around the *Macworld* offices shows that like me, many people have their brightness setting cranked up all the way. The point is that the numbers manufacturers use to meet the MPR-II guidelines may be lower than what actual users are exposed to. So sit back from that display!

Keep in mind, too, that the strongest fields are emitted from the back and sides of a monitor. If you are concerned about EMF, avoid those areas. If you must work next to the side or back of someone else's computer, or if you have an old monitor that you can't replace, *Macworld* found two products on the market that actually reduce ELF magnetic fields. NoRad (310/395-0800) markets a set of special metal bands called ELF Protech that fit around the top and sides of a monitor, deflecting magnetic fields from the monitor toward the bands. *Macworld* tests showed a reduction in ELF magnetic fields of between 17 and 69 percent, depending on the measuring points. ELF Protech is priced from $65 to $131, depending on monitor size. Fairfield Engineering (515/472-5551) manufactures E.L.F. Armor, a steel-alloy cylinder that fits over the yoke of a display's cathode-ray tube. *Macworld* measurements showed significant magnetic-field reductions in a monitor fitted with the device, which must be installed by a qualified technician and costs $89.95.

The Power Line Debate

ON SEPTEMBER 30, 1992, SWEDISH researchers announced the results of two major epidemiological studies involving magnetic fields. A residential study done by Dr. Anders Ahlbom and Maria Feychting of the Karolina Institute in Stockholm found a dose-response relationship between childhood leukemia and exposure to weak magnetic fields from power lines. Ahlbom and Feychting found that "children exposed to more than 1mG had twice, those exposed to more than 2mG had close to three times, and those exposed to more than 3mG had nearly four times the incidence of leukemia of those exposed to less than 1mG," according to a report in the September/October 1992 issue of *Microwave News*.

Several earlier U.S. studies found excess rates of cancer among children living close to power lines, but didn't find an association between the higher cancer rates and actual magnetic measurements (see *Conspicuous Consumer*, October 1991). As in those studies, the Swedish scientists didn't find a relationship between cancer and spot measurements of magnetic fields. They did find a relationship between cancer and estimated field exposures to magnetic fields based on a sophisticated computer model and a Swedish electric power

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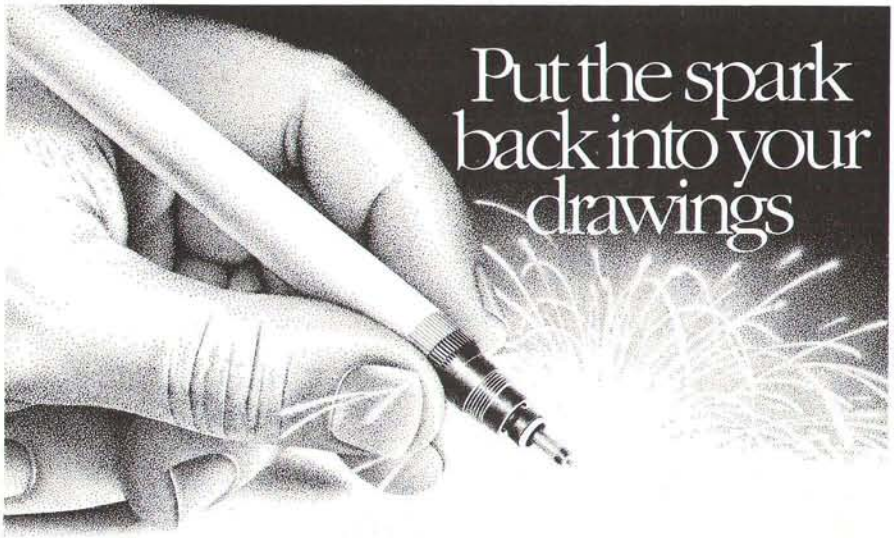

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utility's historical records of the power lines' current loads. Feychting told *Microwave News* that spot measurements don't match historical exposure estimates because the currents on power lines have grown in voltage over the years. As a result, spot measurements tend to overestimate past exposures.

An occupational study done by Dr. Birgitta Floderus and colleagues at Sweden's National Institute of Occupational Health found a relationship between leukemia and exposure to ELF electromagnetic fields in an undisclosed workplace. Workers who were exposed to 2.9mG or more, on average, had 60 percent more occurrences of leukemia than those with the least exposure, which was less than 1.6mG, on average.

Power lines are not computers, but these studies are potentially important to computer users because they point to possible biological effects of electromagnetic emissions. The waveforms of power-line fields differ from those of computer monitor fields; still, says Louis Slesin, publisher and editor of *Microwave News* and *VDT News*, "We can no longer assume there's no cancer risk from high-emission monitors. We can't reject it out of hand."

No Answer Soon

IT WILL BE SOME YEARS BEFORE WE have an answer to the riddle of electromagnetic emissions. If it turns out there is a problem with the ELF magnetic fields emitted by computer monitors, manufacturers should be able to respond fairly quickly. As I mentioned above, many companies have done a great job of reducing EMF and offer displays that meet the Swedish MPR-II guidelines for low emissions. "MPR-II is an integral part of our strategy whenever we plan a new model," says SuperMac's Steve Blank, vice president of marketing. He says any bottleneck in producing low-emission monitors comes from cathode-ray-tube manufacturers such as Sony and Hitachi, not monitor companies. The problem, says Blank, is that tube manufacturers don't see any advantage in building low-cost, low-emission monitors that relatively few customers demand.

Unless that changes, people who want low-emission monitors may have to pay a little more for them. At least they have a choice, unlike a few years ago. **m**

Research assistance by CAROLYN BICKFORD.

Send nominees for sainthood to Service Heroes, *Macworld*, 501 Second St., San Francisco, CA 94107, or via AppleLink (Macworld1) or America Online (Branscum). Conversely, drop *Conspicuous Consumer* a line if a company is ignoring you.

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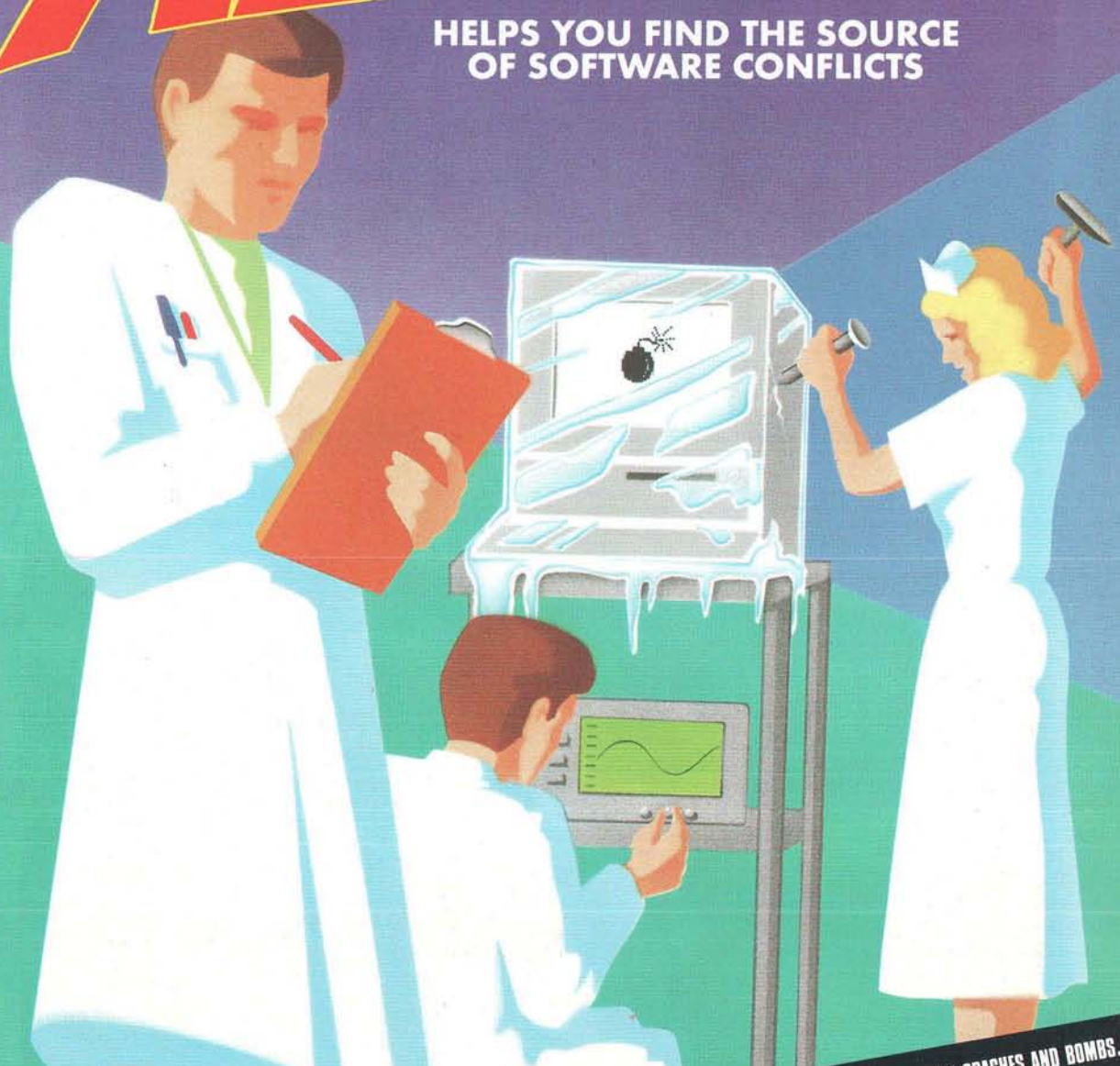

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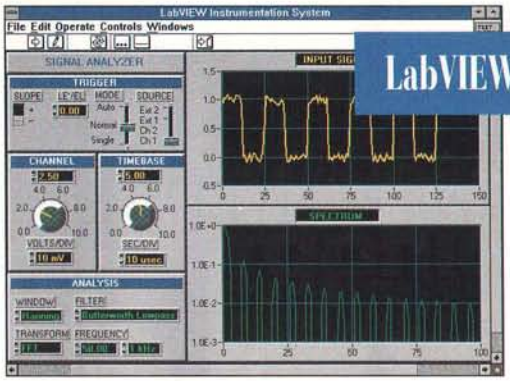

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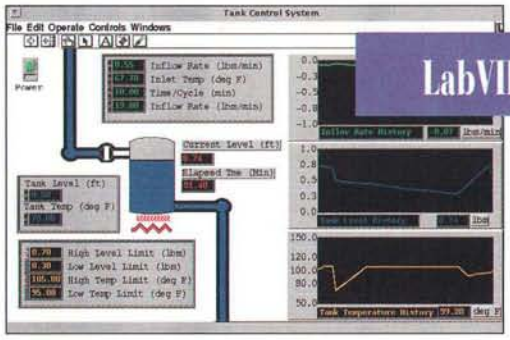

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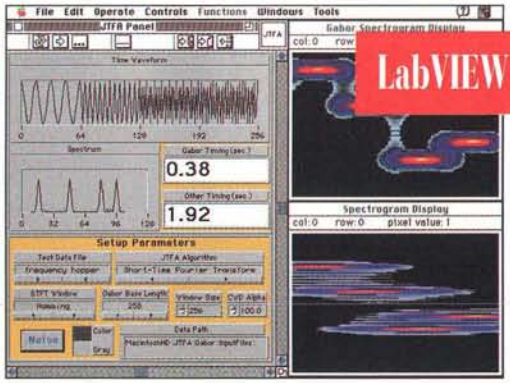

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Lab Notes

Expanding the PowerBook Screen

BY MARK HURLOW

PERHAPS THE MOST IMPORTANT ADvantage the new PowerBook 160 and 180 and the Duos (with docking station) have over the original PowerBooks and the 145 is the inclusion of a video port—which allows them to connect to a large-screen monitor, color monitor, or color projector. Connecting an older PowerBook, an Outbound notebook, or a compact Mac to an external display requires a special peripheral—a video-display adapter. As we tested the different types of PowerBook video peripherals—internal adapters, external SCSI adapters, and SCSI monitors—for the feature "Expanding Your PowerBook" in this issue, we discovered the problems inherent in trying to make a computer do something it wasn't designed to do.

HANK OSUNA

Internal Adapters

THE ONLY INTERnal adapter available for our tests was Computer Care's BookView Imperial, whose circuitry design is very similar to an LC II's internal video. The BookView Imperial maps 1MB of video RAM (VRAM) into the PowerBook's memory (the PowerBook has no VRAM). A connector lets the BookView run an external monitor. Like all video adapters, the BookView treats the Mac's built-in monitor as a second display. Since the BookView Imperial has no graphics processor, the Mac's CPU must do all the processing. Other Mac internal video adapters work similarly.

External Adapters

WE TESTED THREE EXTERNAL SCSI adapters: Radius's PowerView, Aura Systems' ScuzzyView, and Lapis's PowerBase I. All use INITs to reroute video data over the SCSI bus to the adapter (which then sends the data to a monitor), but they differ in how they process the video.

The Radius PowerView tells the Mac's CPU to process the video image, and reserves part of the Mac's RAM to do this. The Macintosh then sends the processed data—initially an entire screen's bitmapped image—via the SCSI cable to the adapter's video buffer, and the adapter sends the image on to the monitor. If subsequently only a portion of the image is updated, the PowerView software sends only the changes to the adapter. This is crucial because SCSI cannot send whole screens of data quickly enough to update the monitor at an acceptable pace.

Instead of having the Macintosh process the video, the ScuzzyView handles the processing itself. The ScuzzyView INIT intercepts QuickDraw calls and forwards them to the adapter box via the SCSI port. The adapter's graphics processor builds the images for the selected monitor in the 1MB video buffer; afterward the ScuzzyView sends those images to the monitor.

The Lapis PowerBase I, a video adapter that supports only monochrome monitors, either processes the video itself or hands it off to the Mac, depending on the requirements of the Mac it's connected to. When running in accelerated mode with a 68000-based machine like the PowerBook 100, the PowerBase I traps QuickDraw calls and forwards them through the SCSI bus to the adapter, which renders the image. With Macs that contain Color QuickDraw, or when running in nonaccelerated mode with a 68000-based machine, the PowerBase I lets the Mac process the image. To speed up screen redraw, the PowerBase I has an accelerated option for color Macs that reduces the number of screen updates—by

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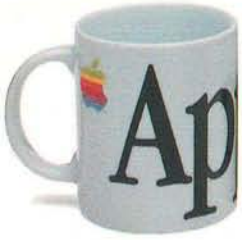

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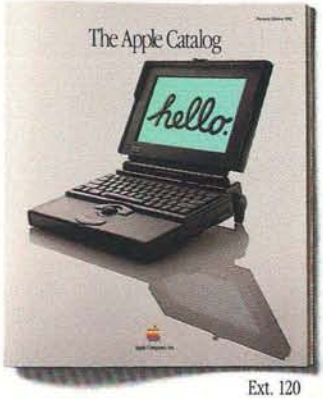

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going directly from the original screen to the changed screen without showing any of the transitional steps in between.

External SCSI Monitors

WITH A BUILT-IN VIDEO ADAPTER, A SCSI monitor works like an external SCSI adapter. The only differences among the SCSI monitors we tested were the graphics processors and the SCSI communication methods the adapters used.

The Outrigger, ViewPort, and PowerPlay (all manufactured by Outbound) each have a built-in 20MHz 68000 microprocessor that handles all video processing. Sigma's PowerPortrait uses a specialized 40MHz Texas Instruments 34010 graphics processor and has more internal memory for displaying at higher resolutions. These two features enable the PowerPortrait to update screens more quickly than the others.

Your Speed May Vary

WE FOUND SPEED VARIATIONS BEtween external adapters that were due to their different designs. In most tests, the ScuzzyView ran faster than the PowerView. Because the ScuzzyView traps only QuickDraw routines (which take very few bytes each in most operations), it usually transfers less data across the SCSI bus than the PowerView, which transfers large bitmapped images—sometimes thousands of bytes per screen. For example, a standard 8-pixel-by-8-pixel color pattern for a 200-by-200-pixel square requires less than 50 bytes for processing with the ScuzzyView, whereas a similar operation on the PowerView sends 40K of processed data over the SCSI bus. But when sending huge amounts of data across the SCSI bus—specifically when redrawing the entire screen, when displaying a new picture, or when scrolling a page in which most of the screen needs to be redrawn—the PowerView came close to or even matched the ScuzzyView's speed. In some instances, the PowerView actually ran slightly faster, since it updated only changed areas of the screen.

Incompatibility Problems

ALTHOUGH TRAPPING QUICKDRAW calls (instead of letting the CPU process the image) speeds up the adapters, it can also cause incompatibilities. We found that many such adapters could not run applications that bypass QuickDraw and draw directly to the screen, such as Claris HyperCard, screen rendering in Aldus SuperPaint, the preview mode in Adobe Illustrator, QuickTime movies, a couple of operations in MacroMind Director, and some fast-action games like Spectre. The reason these applications write directly to the screen is usually speed—QuickDraw is too slow for their purposes. Some of the applications have options to use QuickDraw for screen-rendering instead, and most of the video-adapter vendors either already have or are working on patches for the other applications. Technically, this problem is with the software, not the adapters. But because this method of boosting speed is so commonly used by software developers, vendors of video adapters need to plan accordingly.

Although the PowerView had problems with some operations in MacroMedia Director 3.0 and games like Spectre, we found it to be more software-compatible than the other adapters. Its monitor support, however, was not as versatile as that of its main competitor—the ScuzzyView. For example, due to a limited amount of video RAM (a non-expandable 0.5MB), the PowerView couldn't drive a 19-inch monitor in 256-color mode (which requires 1MB).

Another drawback of the PowerView is its incompatibility with 68000-based machines; it supports only the PowerBook 140, the 170, and the Classic II. The ScuzzyView works with all Macs from the Plus up, and provides color to the Plus, SE, PowerBook 100, and Outbound notebooks. Although these machines are considered monochrome Macs, their ROMs have QuickDraw routines for displaying eight colors—red, green, blue, cyan, magenta, yellow, black, and white. The ScuzzyView software allows you to assign these eight colors to the Finder and to applications that support them.

We also ran into some compatibility problems with Computer Care's internal adapter, the BookView Imperial. Since the BookView Imperial allocates some of the PowerBook's unused memory space for video RAM and a color lookup table, it conflicts with the PowerBook's memory-management scheme. The version we tested, 1.0.7, supports neither System 7's virtual memory nor the Apple RAM Disk. The latest version, 1.0.8, fully supports virtual memory but not the Apple RAM Disk. Computer Care plans to include a RAM disk utility called RAM Disk+ in a future version of the BookView Imperial.

Because internal video boards let the Mac's CPU do all the processing and avoid the SCSI bus bottleneck, they provide the speediest screen updates. Despite their compatibility problems, most of the video adapters we tested provide greater flexibility than do the built-in video ports of the new PowerBooks—because the adapters typically support more and larger monitors. Nearly all are acceptable choices for moving beyond your Mac's small monochrome screen. m

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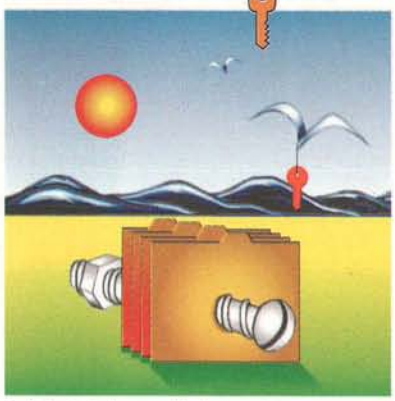

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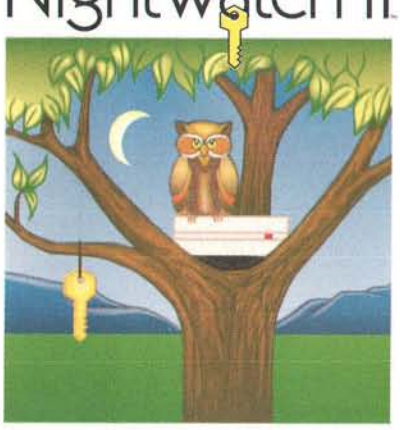

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2.4GB (5¼")	$3299	$3449

HP	Internal	ZFP+
1.05GB (3½")**	$2099	$2199
700MB (5¼")	$1699	$1849
1.2GB (5¼")	$1989	$2139
1.6GB (5¼")	$2399	$2549

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PocketDrive™

Pack it in your pocket, purse or briefcase. PocketDrives offer convenient desktop connection at a great price.

40MB (2½") incl. T-connector	$299
80MB (2½") incl. T-connector	$549
120MB (2½") incl. T-connector	$649
160MB (2½") incl. T-connector	Call!

Optional PocketDock Cable	$59
Extra T-Connector	$59
Universal AC Adaptor	$59

Powerbook Internals

Pack more power in your Powerbook. Comes with brackets and instructions.

80MB Powerbook Internal	$399
120MB Powerbook Internal	$499
160MB Powerbook Internal	Call!

Silverlining™

Hailed as one of the most powerful and useful hard disk management software available, Silverlining offers unique features found no where else! Give your hard disk a Silverlining.

Silverlining	$149

and a friendly sales staff.

Cirrus Optical

Our quiet Cirrus Optical drives offer 128MB removable media storage, compact portability and fast 38ms performance. Includes one free cartridge ($79 value).

	Internal	External
128MB 3½" Optical	$1399	$1499
128MB Optical Disk		$79

Cirrus Backup

Our Cirrus backup solutions have the power to handle large backup jobs. Includes Retrospect™ and one free tape.

	Internal	External
155MB Tape Drive		$549
600MB Tape Drive	$699	$799
1.3-2.0GB DAT	$1249	$1349
4-8GB DAT	$1549	$1649

ZFP Removable

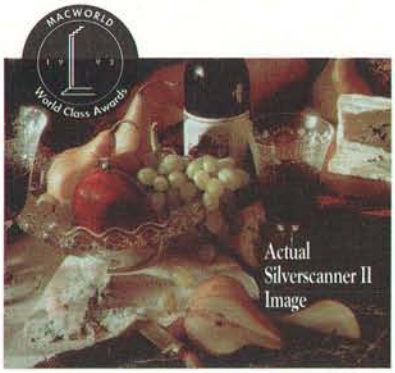
Our 44-88MB removable media drives deliver Syquest technology in a zero footprint case. Includes 1 free cartridge.

44MB Drive	$499
88MB Drive	$549
44MB Cartridge	$63
88MB Cartridge	$98

ExpressDrive™

Here's tight security and portability. La Cie Express Drives offer removable drive convenience and Quantum quality.

ExpressDrive Chassis	$399
50MB Quantum LPS Drive	$399
100MB Quantum LPS Drive	$549
120MB Quantum LPS Drive	$799
240MB Quantum LPS Drive	$949



Silverscanner II™

One look at the image above should convince you that our next generation Silverscanner can really perform! Superior line art, detailed greyscale and gorgeous color are the trademarks of this one pass, 24bit, high resolution, feature-packed scanning machine. Just scan it!

La Cie Silverscanner II

with Color It! and Read-It O.C.R. Pro!	Call!
with Photoshop and Read-It O.C.R. Pro!	Call!
with Photoshop, ColorStudio and Read-It O.C.R. Pro!	Call!

La Cie Silverscanner

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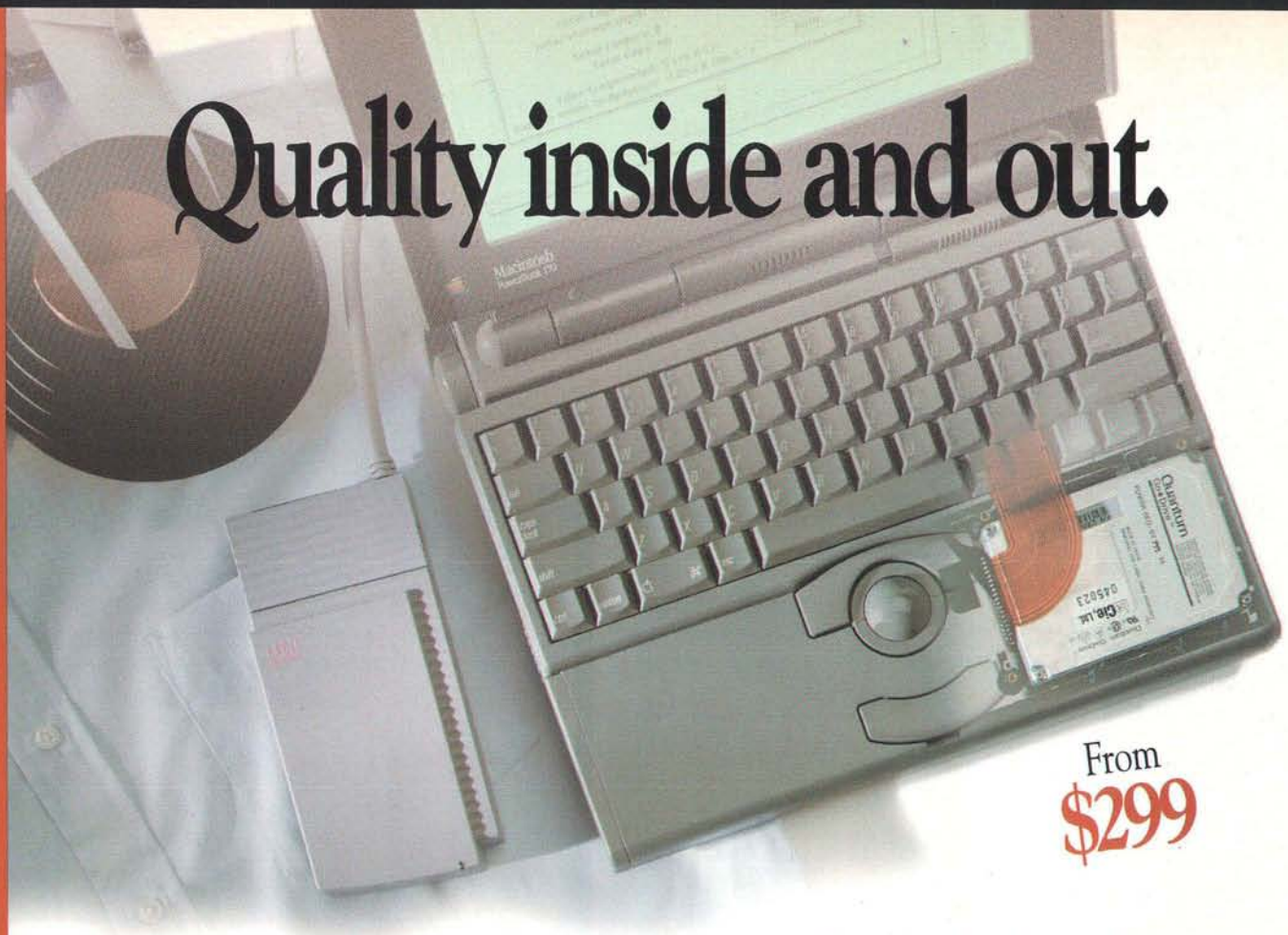
The drives you love from the company you trust, La Cie, a Quantum company.

Quality inside and out.



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Performance in the palm of your hand.

Our sporty 40MB, 80MB, 120MB and 160MB PocketDrives are built for mobility. Travel light (under 10 ounces). Travel fast (19ms seek time). The PocketDrive features Quantum's new 2½" drive technology, whisper quiet operation and our exclusive switchable external termination. Pack in your pocket, purse or briefcase. PocketDrives come complete with our exclusive T-connector adapter for connectability to almost any Mac. For more connectivity, try our optional PocketDock desktop cable. Our T-connector and PocketDock make the PocketDrive system the most versatile and convenient pocket-size drive—anywhere.

Driving power by the book.

Here's Quantum horsepower for PowerBook owners. Available in 80MB, 120MB and 160MB capacities, La Cie's high-performance PowerBook drives come standard with Quantum's high-mileage 2½" drive technology. Lightning fast. Mercedes quiet. Easy to install. La Cie PowerBook drives comes complete with the correct brackets for convenient internal installation and an *outstanding* easy-to-read, easy-to-follow instructional and owners manual. And as always, each drive is fully equipped with System 6, System 7, our number one rated Silverlining disk management software and one of the industry's longest warranties.

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☑ **Disk-for-disk or better replacement.** If you have a problem with your La Cie drive while under warranty, we'll ship you a replacement within 48 hours. We've also been known to replace disks with better ones, rather than make a customer wait. That's how important your drive is to you. That's how important you are to us.

☑ **Unique switchable on/off termination under the hood.** Only La Cie hard drives provide simple, straight forward termination for your SCSI bus. No need for external terminators, just flip a switch. Our advanced circuitry is smart too, termination power is provided only if it is needed.

High speed safety.

See us at Macworld Expo! Moscone Center Booth #607.

From $199

BEST! Macworld Hard Drive under 80 MB

BEST! Macworld Hard Drive 80-200 MB

BEST! Macworld Hard Drive over 200 MB

BEST! Macworld Color Scanner Silverscanner

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TOLL-FREE! Technical Support

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30 Day Money Back Guarantee*

La Cie's Tsunami and Cirrus drives like to be driven hard and fast.

12 millisecond speed limit.

La Cie's Cirrus and Tsunami drives ace every test for performance and value. That's because they're loaded with quality features like Quantum mechanisms, whisper quiet fans, 12ms access time, award-winning chassis designs and our Silverlining disk management software. From 40MB to 1.2GB take home your pick of load capacities. Each delivers the streamlined styling, diminutive footprint and single-handed convenience of the true portable. And that's not all. All Cirrus and Tsunami drives offers the La Cie's exclusive external switchable termination. No wonder they're rated tops in their class, year after year.

Never be afraid to internalize your drives.

If the fear of installation has deterred you from satisfying your desire for a more powerful internal drive, stop fretting. La Cie not only offers a full range of quality Quantum drives for your Mac, PowerBook or Quadra, we make them easy to install. Each La Cie disk comes complete with the correct bracket hardware for internal installation, and an outstanding easy-to-read, easy-to-follow instruction manual, plus all the no-extra-charge, toll-free telephone technical support you need to make the job quick, convenient, and painless.

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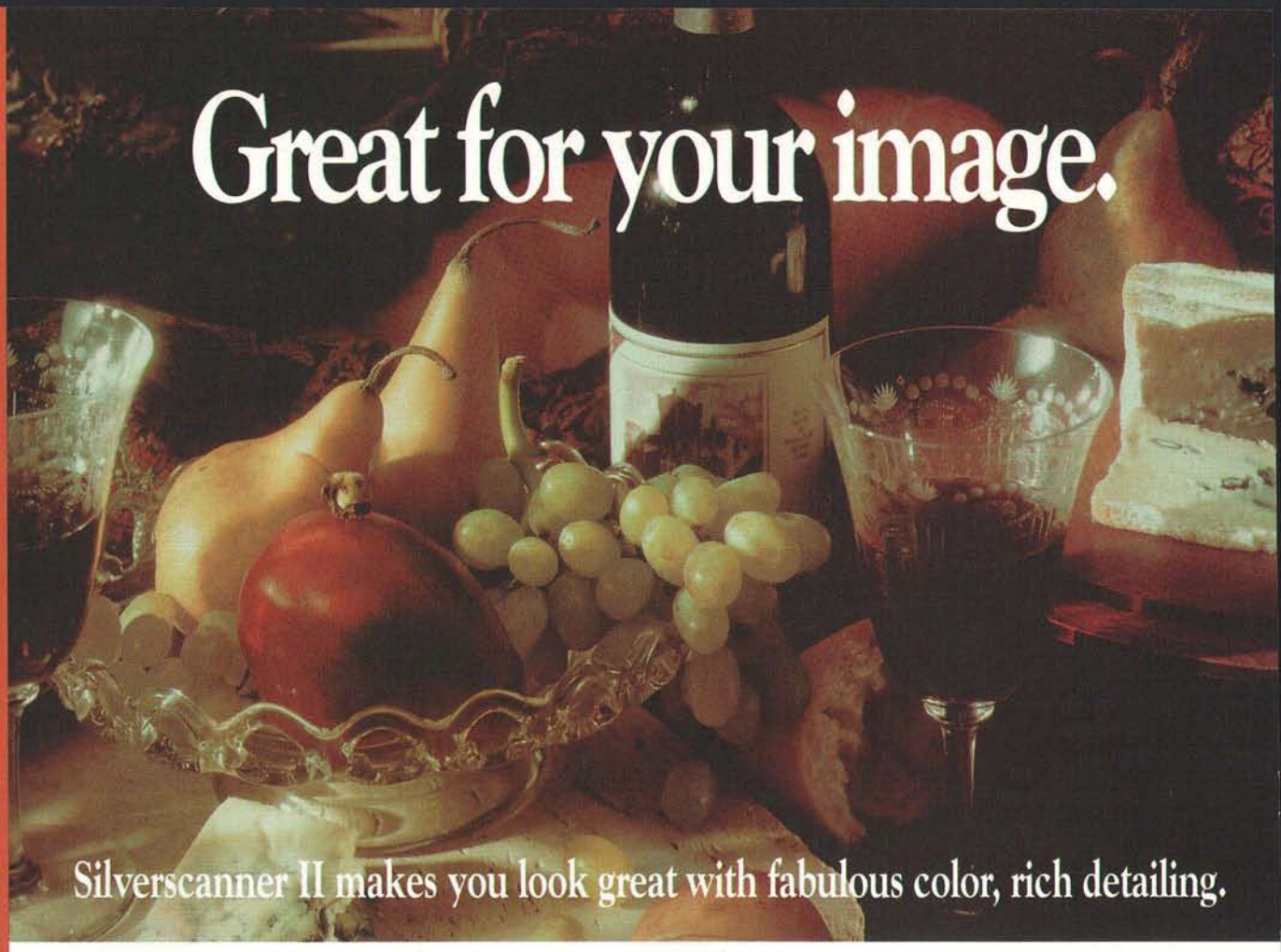
Great for your image.



Silverscanner II makes you look great with fabulous color, rich detailing.

Improve your image.

Our Silverscanner II is so good, we used it to produce this ad. Clean your glasses and take a look. Gorgeous color. Fine image detail. Excellent tonal range. Very high resolution. It's all there. The proof is right in front of you.

Great color from the start.

You can get pretty good color using any scanner if you fool with it long enough. With Silverscanner II, you get great color on the first pass. That's because Silverscanner II's built-in gamma correction operates on 9 bits of data *before* conversion to 8 bits per color. You get clean, bright scans with excellent detail and tonal range in highlight and shadow areas in one pass. No difficult adjustments. No wasted time.

Hug the curves.

When comparing line art, the Silverscanner II really shines! At 1600 dpi, you get what amounts to an electronic stat. Even at 400 dpi, our competitors can't touch our curves.

Superior software at the controls.

La Cie's powerful plug-in modules for Photoshop, Color Studio, Color It!, Enhance, Image Studio and Read-It! have been hailed some of the best software ever written for flat-bed scanners. And with features like dynamic color preview, independent color/brightness controls, nine scan modes, savable scan settings, color dropout and magnified previews, proof scans, 25% to 400% scaling in 1% steps and 25 dpi to 1600 dpi in 1 dpi steps.

See us at Macworld Expo! Moscone Center Booth #607.

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Circle 246 on reader service card

The best place to get your photos printed.

You don't need a photo lab to get computer output like this. A Phaser™ IIsd color printer by Tektronix will do just fine. It's the only dye sublimation printer that gives you detailed, photorealistic images with crisp, clean text—that's TekColor Photofine technology. But you also get Adobe PostScript Level 2 and TekColor PS to match and adjust colors. Plus Pantone certification, networkability, a 24MHz RISC processor for speedy output, a $9995 price tag and a print cost of only $2 per page. All in one little machine. That's what we call picture perfect. Call the leader in color printers at 1-800-835-6100 Dept. 25C for a free output sample. Or call (503) 682-7450, ask for Document 1222 and we'll send information by fax.

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Tektronix

Computer Graphics

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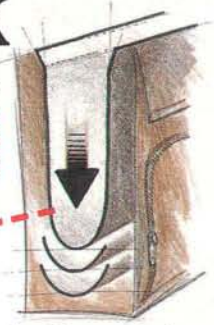
Circle 143 on reader service card

Port™: the best cradle for your powerbook

Swiss made Handle:
Designed for maximum grip and comfort, Port's Swiss made handles are ergonomically contoured on the inside and reinforced with metal on the outside.

Shock absorption system:
Developed and patented by PORT, the SafePort™ shock absorption system offers a level of protection that far exceeds our competition.



The difference is, where others simply pad your notebook, we quite literally defend it. SafePort™ actually cradles your notebook, suspending your computer on a cushion of air that works like a shock absorber to deflect and protect your computer from whatever the road can throw your way.

Metal fittings:
Tough metal hardware anchor both the straps and the contoured handles, heavy duty nylon zippers provide durability and dependability.

High Tech microline:
Our cases are constructed with an outside layer of high tech microline nylon and padded underneath with impact resistant closed cell foam to further cushion and protect your computer.

Colors Available:

Black Burgundy Gray

Ergostrap:
The straps are ergonomically designed to hold the contour of the human shoulder while twin strap adjustments keep the bag centered and stable.

Our cases are designed and engineered to hold all of the items you need to carry. Along with your computer there is room for a printer, A/C adaptator, phone and spare batteries. Plenty of pockets are conveniently located for pens, calculators, note pads, magazines and other miscellaneous items.
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The PORT promises:
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- **If not satisfied, return within thirty days.**
- **Fits all sizes of NoteBook computers.**

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Styles: **886L:** L 18", H 13", W 4" **$169.00**
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PORT 786
Colors: Black, Burgundy, Gray
Styles: **786L:** L 16", H 15", W 4" **$149.00**
786S: L 14", H 15", W 4" **$129.00**

PORT 586
Colors: Black
Style: **586:** L 13", H 12", W 3" **$49.00**

PORT
The Difference

Circle 123 on reader service card

MACWORLD News

THIS MONTH: Photoshop Upgraded • Inexpensive PostScript Printer • Future Mac Processors • Timbuktu Controls Windows • Big PageMaker Upgrade

BY DAN LITTMAN AND TOM MORAN

HEALTH CARE'S KEYBOARD CAN BE MODIFIED TO REDUCE HAND STRESS FOR JUST ABOUT ANY TYPIST.

An Ergonomic Keyboard

At last someone is developing an ergonomically designed keyboard that uses the standard QWERTY layout we all learned to type on. The only problem with Health Care Keyboard's Comfort Keyboard is the price: $675. For that you get a keyboard split into three parts—one for the right hand, one for the left, and one for the numeric keypad—all of which separate, rotate, and tilt to any number of positions to avoid the rigid and stressful position of hands, arms, and shoulders enforced by the flat QWERTY keyboard. At $675, the company must expect to find its market among the already-injured who have insurance or workers comp, but the keyboard could be equally attractive to those trying to prevent injury. Health Care Keyboard, 414/253-4131.—ANN GARRISON

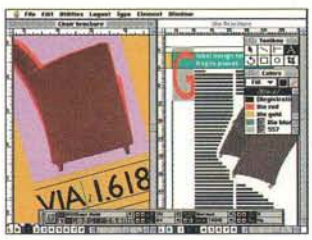
PageMaker's Big Upgrade

With PageMaker 5.0, Aldus is responding to QuarkXPress's encroachment in several key areas of desktop publishing.

First is text. PageMaker 5.0's FreeHand-like text capabilities support rotating text by hundredths of a degree; flipping, mirroring, and skewing text; and editing and kerning text after it is modified.

Second is color. Process-color separations can be printed from inside PageMaker; objects can be set to overprint or knock out underlying color; at least 7 (maybe 12) color spaces will be supported; and colors from imported EPS graphics can be applied to elements in the PageMaker document.

Third is printing. Version 5.0 can print discontinuous page ranges and add printers' marks and document information to output, and Aldus claims that the new version's printing speed is eight times greater than version 4.2's.



COLORS FROM THE IMPORTED GRAPHIC APPEAR IN PAGEMAKER 5.0'S COLOR PALETTE. NOTE THE ANGLE OF ROTATED TEXT.

PageMaker 5.0 supports dragging elements between multiple open documents and searching their text with the story editor. Aldus is bundling numerous Additions to extend PageMaker's features, including a tracking tool and a simplified imposition tool. List price remains $795. Aldus, 206/622-5500.—D.L.

IBM Color Jetprinter

Lexmark International has introduced the IBM Color Jetprinter PS 4079, a 360-dpi color ink-jet printer that can work with Macs and DOS machines simultaneously. The printer includes a PostScript language emulation that was cowritten by Lexmark and Phoenix Technologies.

ROBERT PERRY

THE IBM COLOR JETPRINTER PS 4079 WORKS WITH MACS AND PCS AND PRINTS 360 DPI.

The Color Jetprinter PS 4079 can simultaneously accept files from Macs and PCs over its serial, parallel, and LocalTalk connectors using an optional $39 Y-connector. The PS 4079 incorporates a RISC processor for higher performance and prints 7/10 color page per minute, according to Lexmark. Now shipping, the IBM Color Jetprinter PS 4079 lists for $3495 including 4MB of RAM. It can be upgraded to 16MB. The printer comes with Mac and PC drivers and with ColorGrade software for producing fine textures and dithering patterns that reduce banding. The printer also includes one paper tray for paper up to legal size. Lexmark, 800/358-5835.—T.M.

DEC PostScript Printer for under $1000

Computer giant Digital Equipment Corporation (DEC) has brought out the DEClaser 1152 Desktop Laser Printer, the least-expensive PostScript laser printer yet. The 4-ppm DEClaser 1152 will officially list for $1299, but DEC will publish rebate coupons that will bring the list price to $999. The one-to-a-customer coupons

continues

A Macintosh to start a

Imagine you could design your own personal computer. What would it be? It would be fast, of course. Faster than your basic 486 machine. Fast

The Apple Macintosh Quadra.

enough to handle the rendering, animating, design and analysis jobs that often require a workstation.

It would have immense storage and memory capacity. And it would have features like high-performance networking and accelerated video support built in.

Macintosh Quadra runs all the most powerful engineering software.

You would make it flexible enough to run any kind of application. Affordable enough to put on every engineer's desk. And as long as you're fantasizing here, you'd make it as easy to set up, easy to learn and easy to use as an Apple® Macintosh® personal computer.

But it's not a fantasy. It's a Macintosh Quadra.™

By any measure, the Macintosh Quadra 700 and 950 are two of the most powerful personal computers ever built. Both are based on the Motorola 68040 (rated at 20 and 25 MIPS, running at 25 and 33 MHz), which integrates the processor, math coprocessor and RAM cache all onto one chip.

They're up to twice as fast as any of their forebears. Fast enough to beat the chips off comparably priced 486 computers from IBM, Compaq and Dell.* And fast enough to make programs like AutoCAD, MicroStation Mac,® MacBRAVO! and VersaCAD perform at a level once seen only in dauntingly complex workstations.

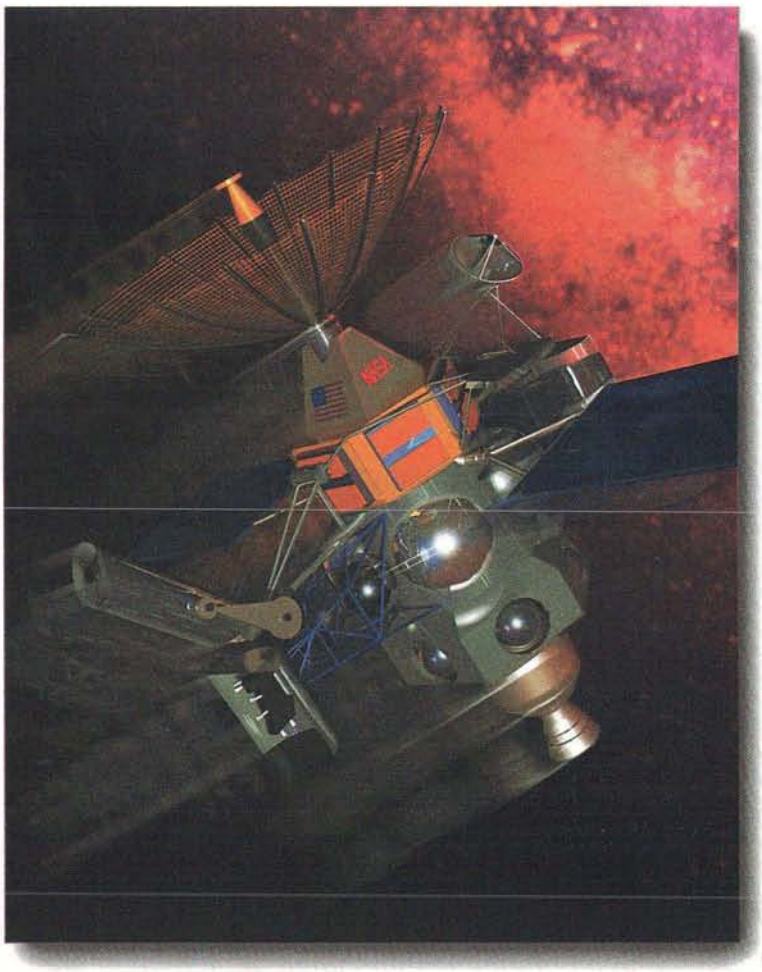
Built-in 24-bit video lets you create photo-realistic images without the expense of an extra card.

High-performance subsystems provide built-in support across the board: Ethernet networking, accelerated 24-bit video** support and faster SCSI and NuBus™ slots.

You can add a 400MB hard disk to both

*Comparisons are based on a 1991 independent research study conducted by Ingram Laboratories that tested a variety of personal computers running applications available for both the Macintosh and Microsoft Windows 3.0 environments. **24-bit video support for up to a 16 product specifications and descriptions were supplied by the respective vendor or supplier. Orbiter images created by Jerry Flynn. ©1992 Apple Computer, Inc. Apple, the Apple logo, A/UX, Mac, Macintosh and "The power to be your best" are registered trademarks and Macintosh Quadra and is a trademark of Wolfram Research, Inc. MicroStation is a registered trademark of Bentley Systems Inc. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corp. Motorola is a registered trademark of Motorola Corp. NuBus is a trademark of Texas Instruments*

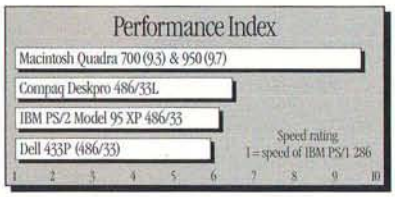
with the power revolution.



communications architecture lets you easily take advantage of features like distributed processing, allowing programs like RenderPro and BackBurner to utilize excess CPU cycles on other Mac computers or workstations for faster renderings.

There are two Macintosh Quadra models. The 950 sits next to your desk; the 700 fits on top of it.

And Macintosh Quadra fits in with the PCs you already own. The built-in Apple SuperDrive,™ used with Apple's new Macintosh PC Exchange software, allows you to share files easily with MS-DOS PCs via floppy disk or over a network. And with Apple's fully compliant version of UNIX®—A/UX®—you can even run UNIX, X Window, MS-DOS and Macintosh programs all at the same time.



Macintosh Quadra significantly outperforms 486 PCs from IBM, Compaq and Dell running Windows 3.0.

It all adds up to the kind of power that moved *PC Week* to give the Macintosh Quadra its highest satisfaction rating in the categories of overall performance, price relative to performance, expansion capability and ease of installation and configuration.†

the 700 and the 950 to accommodate the largest CAD files. And the 950 even lets you add a CD-ROM drive or a removable cartridge drive, and a disk array or more than a gigabyte of internal hard disk storage.

You can increase the memory of the 950 to up to 64MB of RAM for handling compute-intensive applications like three-dimensional modeling and stress analysis.

Over your network, the unique Apple interapplication

Your authorized Apple reseller would be glad to show you all this and more. For the name and location of the one nearest you, call 800-538-9696, extension 200.

And soon you'll discover the latest power of Macintosh personal computers. The power to start a revolution. The power to be your best.®

monitor—also available for 21" monitors with optional third-party video card. †PC Week, December 23/30, 1991, ©1991 Ziff Communications Company. Mention of third-party products is for informational purposes only and constitutes neither an endorsement nor a recommendation. All SuperDrive are trademarks of Apple Computer, Inc. AutoCAD is a registered trademark of Autodesk, Inc. BackBurner is a trademark of Specular International. MacBRAVO! is a trademark of Schlumberger Technologies, Inc. MacTOPAS is a registered trademark of AT&T Graphics Software Labs. Mathematica RenderPro is a trademark of Strata, Inc. Vellum is a registered trademark of Ashlar Incorporated. VersaCAD is a registered trademark of Versacad Corp. X Window System is a trademark of MIT. UNIX is a registered trademark of AT&T. This ad was created using Macintosh computers.

PULLING ALL YOUR MEDIA TOGETHER REQUIRES SOME FANCY FOOTWORK.

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Integrating multimedia elements to create a spectacular presentation can be a bizarre, ritualistic dance. But with Passport Producer™—media integration software for the Macintosh®—it's simple and easy to keep complex multimedia presentations in step. Passport Producer serves as the master control for your entire production, synchronizing QuickTime™ movies, animation, graphics, text, digital audio and MIDI into one file. With Passport Producer, you integrate media elements on a visual "cue sheet" based on SMPTE time code that permits frame-accurate "cue" placement. By linking to programs that create multimedia elements, you can easily integrate and edit standard file types. When you need to edit your content, simply double-click on the cue and Passport Producer automatically opens the editor of your choice. Play back your presentation with the push of a button. It's that fast and simple. So if you feel that building a multimedia presentation requires a lot of tricky and cumbersome moves, get Passport Producer and you'll waltz your way through.

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Integrate and edit Macintosh standard file types, including:

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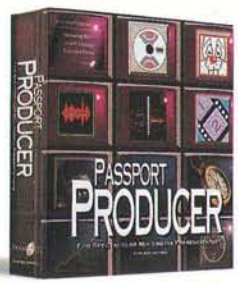

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Circle 271 on reader service card

RICHARD RETHEMEYER

THE DECLASER 1152, A 4-PPM POSTSCRIPT PRINTER, WILL SELL FOR $999.

will be good through March 31.

The 300-dpi printer comes with 4MB of RAM, Adobe's PostScript Level 2, PCL Level 4 (for DOS machines), 17 scalable fonts, and a slot for an optional font cartridge to expand to 43 fonts. The DEClaser can accept data simultaneously from several Mac hosts and DOS hosts through serial, parallel, and LocalTalk connectors. DEC scheduled first shipments of the DEClaser 1152 printer for January. DEC, 508/493-5111.—T.M.

SilentWriter 95fx

NEC Technologies has introduced the SilentWriter Model 95fx, a version of the company's SilentWriter 95 laser printer with the addition of an integrated PostScript fax board. The Model 95fx can send a fax compressed in Adobe's new PostScript fax format, which means that another similarly equipped printer can receive the file and produce a plain-paper fax that looks just like the original PostScript document. The PostScript fax format compresses the data so that the transmission is faster than for a standard fax.

The Model 95fx comes with NEC drivers that the company says allow it to work with almost any DOS, Windows, or Macintosh application. Any user on the network can access the fax capability, which includes normal Group III faxing, an electronic fax directory, a time-delay feature, and multiple addressing.

The SilentWriter Model 95fx produces 6 ppm, includes PostScript Level 2 and an emulation of HP's PCL 5, and has 35 scalable typefaces. It lists for $2348 and is shipping now. NEC, 508/264-8000.—T.M.

TREND

Structured Publishing

Publishing jobs that require repeatedly reorganizing a document's contents or changing its appearance without changing its contents can overwhelm standard desktop publishing tools, but tools for the Mac based on SGML (Structured Generalized Markup Language) are finally making it possible to automate such tedious work.

SGML documents have precisely defined parts and relationships between parts —for example, a chapter might be defined as always containing at least two subheads. A tag identifies each part, and filters for SGML-savvy page-layout software can read tags to import and automatically format a document, or tags can become the parts' attributes in a document database.

SoftQuad publishes Macintosh SGML tools, including Author/Editor 2.1 ($995), where text is entered and tagged; and RulesBuilder 2.0 ($995), where a document's rules and tags are developed. Author/Editor is a solid text-editor in its own right; for SGML work it includes outline-like control over the display of nested levels of document parts, and a view showing the contents of a document with all the formatting assigned to tags. RulesBuilder performs such tasks as finding conflicting rules. SoftQuad, 416/239-4801.—D.L.

TOM WOLFF

RICHARD LOVE HAS MOVED THE AMERICAN CHEMICAL SOCIETY'S 22 SCIENTIFIC JOURNALS ONTO SGML TOOLS.

News

ReadySetGo Rises Again

Manhattan Graphics' ReadySetGo (RSG) was the Macintosh's first real desktop publishing software. After enduring Letraset's unsuccessful attempt to market the DTP package as DesignStudio, Manhattan Graphics reacquired the program, restored its original name, and set to work on version 6.

Version 6 has abundant left- and right-hand master pages (26 each); provides precise typographical control over such details as small-cap sizes and first-line leading; and has new text features including more page-number formats and can count words and characters. Objects can be anchored together with precise control over their offset.

ReadySetGo supports add-ons called annexes; version 6 will ship with several annexes, including one for separating color that has some trapping capability. RSG lists for $395. Near-future plans call for tools for creating tables and for generating indexes and tables of contents. Manhattan Graphics, 914/725-2048.—D.L.

READYSETGO VERSION 6'S OBJECT-ANCHORING PROVIDES PRECISE CONTROL OVER OBJECTS' POSITION ON THE PAGE.

CMS's High-Capacity Drives

Addressing the need for ever-more-capacious hard drives, CMS Enhancements has unveiled its Platinum II series of drives ranging from 660MB to 2.1GB. The storage devices have fast average access times, ranging from 8ms to 14.5ms.

CMS has begun shipping the Platinum II drives at list prices from $3995 for the 660MB model to $8990 for the 2.1GB model. CMS, 714/222-6000.—T.M.

TURKEY SHOOT

DESIGN FLAWS NOTED

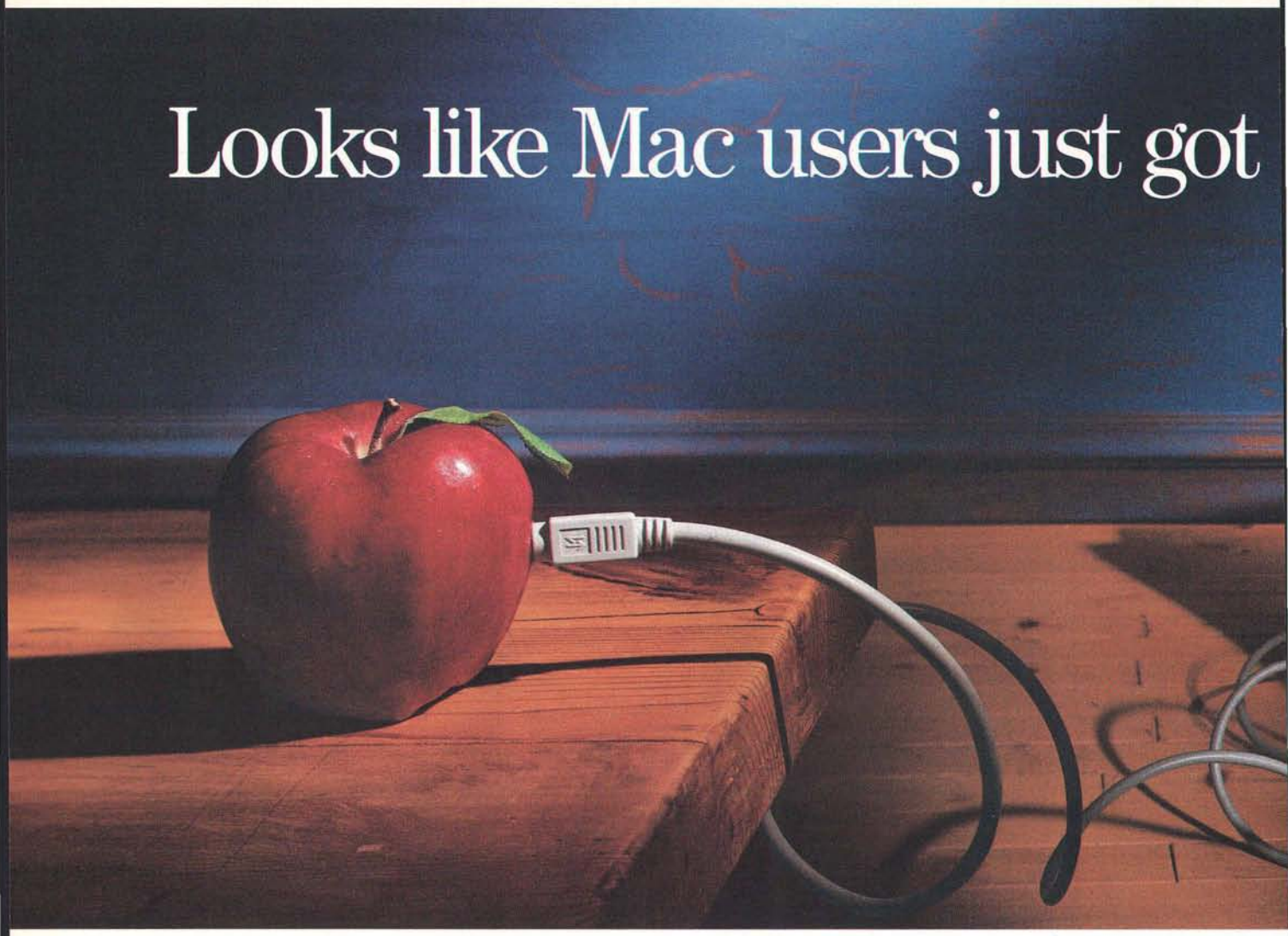
Microsoft Works 3.0 Works will allow itself to be installed only on your start-up volume (though it can be moved to a different volume after installation). Doesn't this sound like a good reason to throw away some junk on your hard drive?

FileMaker Pro 2.0's Data-Export Is it Mac, or is it Windows? When exporting data for a mail merge, blank spaces between words in the field names are mysteriously replaced with underlines. Nifty: now your mail merge templates can't read in the data.

More FileMaker Pro mail merge mysteries: heaven forfend you should have blank fields in your database, because they'll come out the other side of the black box with double quote marks where once was void. Some word processors will read the quote marks as data and happily enter them in your mail merge; others will read them as extra fields and move your real fields over.

Macworld will send you a Turkey Shoot T-shirt if we shoot your turkey in this column. See *How to Contact Macworld*.

Looks like Mac users just got



The new generation HP LaserJet 4M printer.

The HP LaserJet 4M is the one for all. Macintosh and PCs alike. This new generation provides superior output with 600 dpi, Resolution Enhancement technology and microfine toner. 6MB built-in memory means that PostScript files and full-page graphics print out crisp, clear and fast.

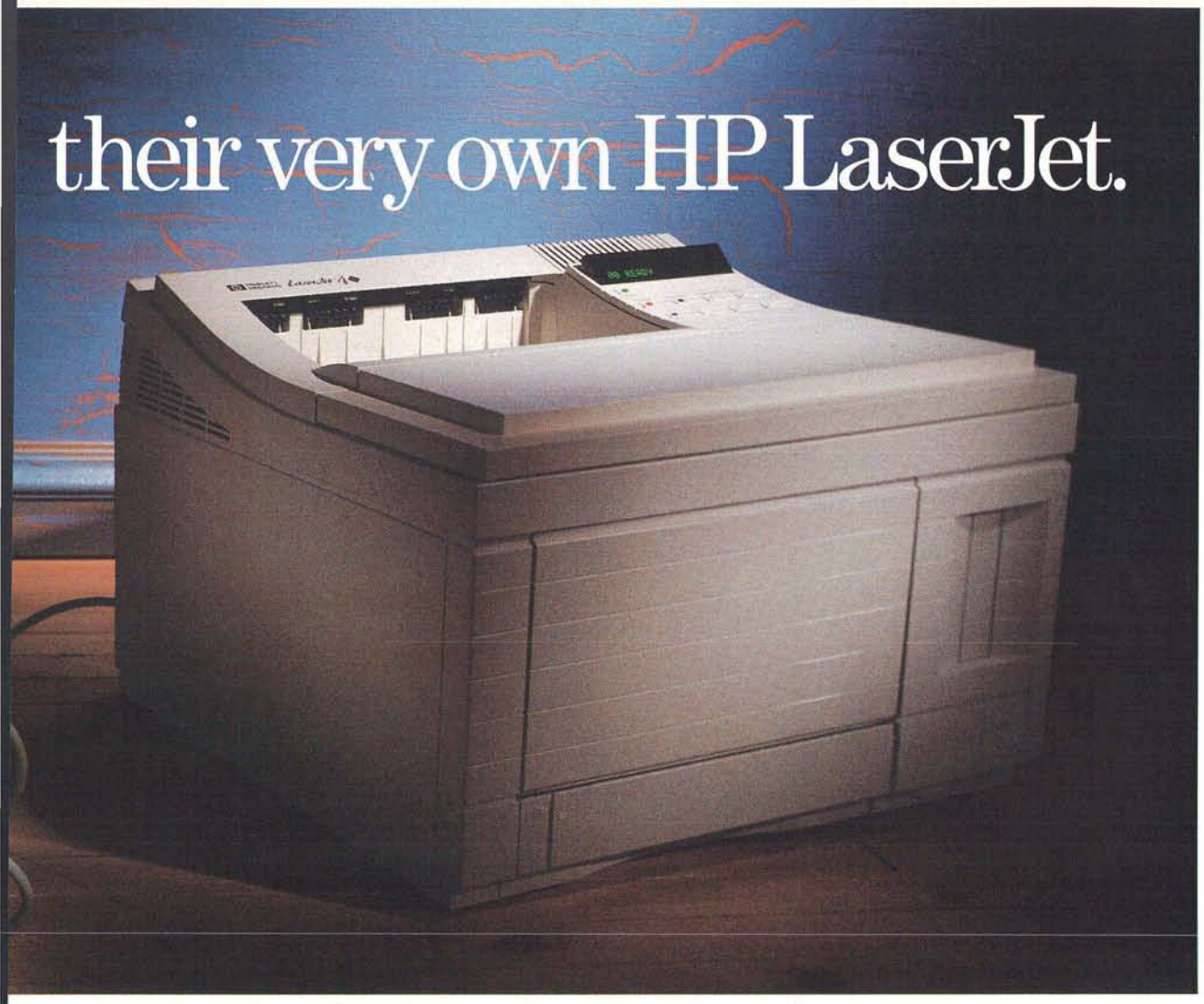
At last. Hewlett-Packard introduces a laser printer built specifically for the Mac from the ground up—the new LaserJet 4M. A laser printer for Mac users with everything you expect. And, more importantly, everything you need. From built-in PostScript Level 2 software from Adobe and 6 MB of memory, to standard LocalTalk and optional EtherTalk. Features which make certain this new generation in laser printing is ready-made just for you.

Faster printing of complex documents.

The finest print quality in its class. In addition to complete Macintosh compatibility, the LaserJet 4M printer also delivers the finest print quality of any 600 dpi machine available—thanks to

© 1992 Hewlett-Packard Company PE12276 *Suggested U.S. list price.

their very own HP LaserJet.



HP's microfine toner, Resolution Enhancement technology, and an advanced engine expressly engineered for 600 x 600 dpi.

New generation features mean you will lose no time getting your work onto the page. A new RISC processor and 6 MB of standard memory accelerate formatting and I/O speeds, so complex PostScript language and graphics files are rendered faster and more clearly than ever before.

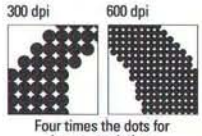
6 MB of memory built in.

Greater flexibility.
But this wouldn't be an HP-caliber breakthrough if the innovations weren't across the board. That's why, even though the new generation LaserJet 4M printer is built for the Macintosh, it will perform for DOS and Windows users as well... automatically. Automatic language switching (between PCL 5 and PostScript) and three hot I/O ports (serial, parallel, and LocalTalk) make sure users are able to share the printer simultaneously. Without waiting.

Also, because of the LaserJet 4M printer's two integrated paper trays (total capacity 350 sheets) and optional 500-sheet tray and power envelope feeder, you will save time, avoid paper-handling hassles, and gain flexibility.

HP quality and reliability.
The new generation LaserJet 4M printer lets you enjoy the one particular no other Macintosh laser printer can offer—the renowned quality and reliability which comes with owning an HP peripheral. Not to mention our outstanding customer support,

Increased paper handling.



Four times the dots for better resolution.

where information about how to get the most from your printer is never more than a phone call away.

Surprisingly affordable.
Perhaps the most remarkable attribute of the new LaserJet 4M printer is the price—$2,999.*
A breakthrough in its own right. So call **1-800-LASERJET (1-800-527-3753), Ext. 7135** to receive a print sample** and comparison disk to see the quality for yourself.† Or visit your nearest authorized HP dealer and see the printer built to add some polish to your Apple.

HEWLETT PACKARD

**To have a LaserJet 4M printer data sheet sent immediately via fax machine, call 1-800-964-1667 from your touch-tone phone. †In Canada call 1-800-387-3867, Ext. 7135. Adobe and PostScript are trademarks of Adobe Systems Incorporated which may be registered in certain jurisdictions.

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Simple Plug-in Design

Make sure the LC accelerator you choose isn't meant for a IIci

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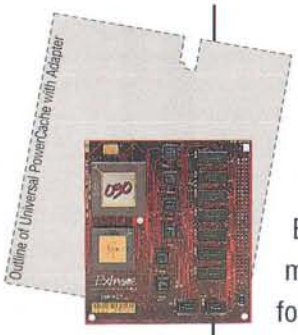

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Circle 142 on reader service card

News

Falcon Flies in Color

What if they gave a war and nobody came? Well, from the cockpit of your F-16 in Spectrum HoloByte's Falcon MC flight simulator, you could wage war against your own Mac. And you'd be ready if the enemy did challenge your air space by logging on across the office network or via modem.

In addition to multiuser capability, the new Falcon runs in color (in fact, it requires a color Mac), and its terrain is rendered in 3-D. It has new weapons and new missions; and for lovers of the martial life, the new version is packed with detail about the planes, your stable of pilots, mission briefings, and so on. Falcon MC will list for $69.95. Spectrum HoloByte, 510/522-3584.—D.L.

NO GROUND-FIRE TO PROTECT THIS BRIDGE. NOTE HOW FALCON MC'S TERRAIN APPEARS IN THREE DIMENSIONS.

The Ultimate PIM?

No one quite agrees on what personal-information-management software is supposed to be, but ProVue's Power Team covers just about every possibility.

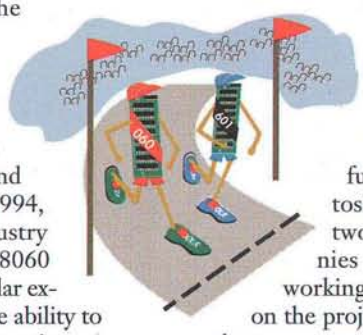
To the standard phone book, calendar, and to-do list, Power Team adds a checkbook manager, an expense-report generator, a mailing list and correspondence manager, and a calculator. Though each module is a separate database, information from each module is available in all other modules. Perhaps Power Team's most interesting feature is its text-parsing ability—for example, type "lunch with Sue on Friday" and Power Team creates an appointment at noon on Friday and puts Sue's name in it.

Power Team is $149.95. It uses the new version of ProVue's very fast database Panorama, which lists for $395. Version 2.1's new features are mostly aimed at high-end users, with calendar functions, improved text parsing, advanced printing controls, many new macro commands, and new template- and form-design features. ProVue Development, 714/892-8199.—D.L.

68060 to Overpower the PowerPC

While attention has been focused on the prowess of the upcoming PowerPC RISC processor, Motorola has been working quietly on a powerful successor to the 68040, the 68060, that will outperform the first PowerPC to be released, the PowerPC 601. Motorola's 68060 will perform in the range of 100 million instructions per second (MIPS), compared with the 29 MIPS of a 68040 with a 33MHz clock rate. Because the 68060 will be faster than the PowerPC 601, the 601 will be relegated to a mid-range Mac, while the 68060 will get a glamour job in a line of high-end Macs in early 1994, according to industry sources. The 68060 employs super-scalar execution, that is, the ability to perform two instructions per clock cycle. Motorola plans volume shipments of a 50MHz 68060 in early 1994, with a 66MHz chip to follow. Motorola skipped development of a 68050 in favor of the more radical 68060 design.

—JONATHAN CASSELL



DOROTHY CARICO SMITH

First Silicon on PowerPC

IBM and Motorola recently produced the first working prototypes of the PowerPC 601, which will be the first model in the PowerPC line of RISC microprocessors that will be the brains of a future generation of more powerful Macintoshes. The two companies began working together on the project a little more than a year ago, when the Apple-IBM-Motorola alliance was announced.

The PowerPC 601 microprocessor is considerably more powerful than Motorola's existing 68040 microprocessor, which is used in Apple's Quadra models. The 50MHz PowerPC 601 performs at a very preliminary SPECfp89 (Systems Performance Evaluation Cooperative floating-point) rating of 60, and at a SPECint89 (integer) rating of 40. The 66MHz version of the same chip operates at a preliminary SPECfp89 of 80 and SPECint89 of 50, according to an IBM spokesperson.

IBM and Apple are both examining and testing the early chips now, according to spokespeople for both companies. IBM expected to come out with a non-Mac system using the new processor by the end of 1993, while Apple said its first PowerPC-based Mac should appear in early 1994. Other companies will also design systems around the new chips. IBM and Motorola are working on three more members of the PowerPC microprocessor family that will be even faster.—T.M.

Radius Board Speeds Photoshop

The Radius DSP Booster is a piggyback board for the Radius Rocket accelerator that speeds the filter processing of Photoshop by as much as 800 percent on a Quadra 950, according to the company. Intended for users who regularly manipulate files of 20MB or more, the DSP Booster board contains two digital signal processor chips that compute up to 66 million floating-point math operations per second.

The DSP Booster, which works with Photoshop 2.5, comes with modules for Unsharp Mask, Sharpen, Sharpen More, Find Edges, Blur, Blur More, and Gaussian Blur. It was expected to ship by February and list for $899. Radius, 408/434-1010.—T.M.

DESKTOP LIBRARIAN

Books for the Macintosh Reference Shelf

- *The Macintosh Bible*, 4th edition, by Arthur Naiman, Nancy E. Dunn, Susan McCallister, John Kadyk, and a cast of thousands (1992, $32). The latest edition of the widely acclaimed ultimate collection of Macintosh tips. This 1233-page behemoth contains 800 pages of new material on just about every topic known to Macintosh. Includes a 68-page glossary, a list of products and companies, an index, and disks with 3MB of freeware and shareware applications. Price also includes three free updates. Peachpit Press, 510/548-4393.

TOM GIBSON

THE MACINTOSH BIBLE, 4TH EDITION, AND THE MACWORLD MUSIC & SOUND BIBLE.

- *Macworld Music & Sound Bible*, by Christopher Yavelow (1992, $37.95). This even more enormous volume (1398 pages) starts with the basics of Macintosh music and sound, then covers sound generation, organization, and editing; composition; notation; live performance; postproduction; film, video, and synchronization; multimedia; and education. Appendixes cover other reading materials, MIDI, and manufacturers of sound and music equipment, among other topics. Includes an index. IDG Books Worldwide, 415/312-0650.—T.M.

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Each transfer adds time to your project and may introduce errors at any point. Plus you have to be an expert in at least four packages to get your work done. And if a mistake is made, you have to start all over again.

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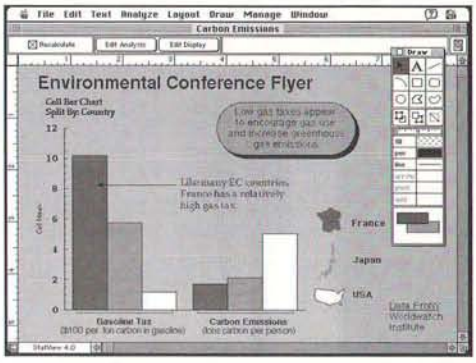
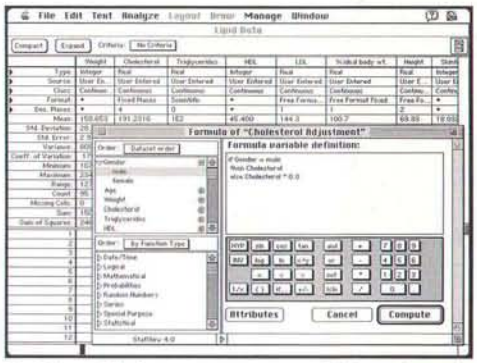
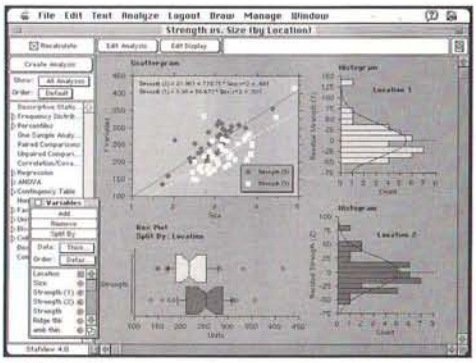


StatView 4.0's presentation capabilities rival those of the most powerful stand-alone graphing packages.



StatView 4.0's data management capabilities go beyond the features of conventional spreadsheet programs.



With StatView 4.0, you can save your analyses as templates and apply them to any dataset.

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Circle 19 on reader service card

TREND

Long-Distance LANs

CARVING A TRENCH DOWN THE MIDDLE OF A LOS ANGELES–AREA STREET TO MAKE ROOM FOR MFS'S FIBER LINES.

In the past, companies needing to connect remote offices have resorted to using poky 2400-bps or 9600-bps modems over dial-up lines. But Metropolitan Fiber Systems has been busily laying fiber-optic cable that connects 14 of the nation's largest urban areas, and the company's subsidiary MFS Datanet is leasing room on the fiber, making it possible for Macs and other computers in different buildings—or different cities—to connect as if they were all in the same office. Ethernet or token ring networks (or AppleTalk though an Ethernet network) can hook up through Datanet's High-Speed LAN Interconnect (HLI) and transmit at their regular speeds.

HLI pricing depends on configuration, but a typical situation might cost $1000 per building for a one-time hookup charge, $2000 per building for monthly access charges, and $8500 per month for unlimited traffic at Ethernet speed. Slower speeds are available at less per month. MFS Datanet, 408/975-2200.—D.L.

BETA WAIT

Long-awaited products

ACIUS'S 4D Server
Shown publicly January 1991. Current ship date projected: after just-announced 4th Dimension 3.0 ships.

FoxPro/Mac
Fox Software discussed publicly winter 1990/91. Microsoft acquired Fox earlier in 1992, and says it will ship FoxPro/Mac "when it's ready."

Interleaf 5
Discussed publicly October 1990. No ship date projected.

Claris's MacWrite Pro
Announced spring 1991. Current ship date projected: end of 1992.

News

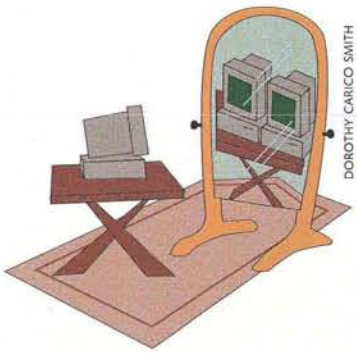
Plain-Paper Color Printers

Tektronix has introduced the Phaser 200e and Phaser 200i, two thermal-wax printers that use new technology to print on plain paper with excellent results. The new technology involves first laying down a primer coat that evens out the ridges and valleys in ordinary printer paper. The printers place the primer coat only on the parts of the paper that will be printed on later. Both printers output 2 pages per minute.

LUIS DELGADO

THE PHASER 200E IS A COLOR THERMAL-WAX PRINTER THAT PRODUCES 2 PAGES PER MINUTE.

The Phaser 200e has a 16MHz 29000 RISC processor; comes with 4MB of RAM expandable to 8MB; and includes PostScript Level 2, 17 Adobe fonts, and HPGL. The 200e lists for $3695. The Phaser 200i has the same features but with a 24MHz version of the processor, 6MB of RAM expandable to 14MB, 39 Adobe fonts, and a SCSI port. The 200i lists for $5995. Both printers incorporate a serial port, a parallel port, and an AppleTalk connector; and both can be expanded to support TCP/IP and DECNET. The 200i can support an optional EtherTalk expansion. Tektronix scheduled first shipments of both printers for January 1993. Tektronix, 503/682-7377.—T.M.



DOROTHY CARICO SMITH

Different Data Compression

Stacker is a utility that compresses data to squeeze approximately twice as much onto a hard drive. This requires a trick somewhat like keeping double books: the Macintosh innocently keeps track of where it thinks its files are, while Stacker manages the files' real locations and intercepts every request the Mac makes for files.

Because of the way Stacker allocates blocks, it is effective only on drives smaller than 1GB. Stac Electronics claims the Stacker way is more reliable because the Macintosh doesn't deal with the disk driver. Just in case, Stacker comes with a recovery utility.

Stacker is intended to be used with drives smaller than 1GB. Pricing is expected to be less than $150. Stac Electronics, 619/431-7474.—D.L.

Portable Fax Modems

For the world travelers among us, two companies have recently introduced high-speed external fax modems for PowerBooks and other Macs. The products are the PM14400FX Pocket modem from Practical Peripherals and the aptly named WorldPort 14,400 Fax for the PowerBook from U.S. Robotics. Both small devices send and receive data at a basic rate of 14,400 bps, but can achieve a maximum rate of 57,600 bps by using the included V.42bis data-compression and V.42 error-correction protocols. The PM14400FX Pocket can also send and receive faxes at 14,400 bps; however, few existing fax modems support this fax transmission rate, so it may not be easy to take advantage of the greater speed. The WorldPort fax modem sends and receives faxes at the standard 9600-bps transmission rate. WorldPort comes with fax software and MicroPhone communications software. The WorldPort lists for $699.

The PM14400FX Pocket comes with QuickLink II Fax software and has six pages of online help in ROM. The modem recognizes phone-credit-card prompting tones, making autodialing software more convenient. The Pocket modem lists for $529.

Both fax modems were slated to ship in December. Both operate from batteries or through an included AC adapter. Practical Peripherals, 805/497-4774; U.S. Robotics, 800/342-5877.—T.M.

SCOTT PETERSON

THE WORLDPORT 14,400 FAX FOR THE POWERBOOK (LEFT), AND THE PM14400FX POCKET.

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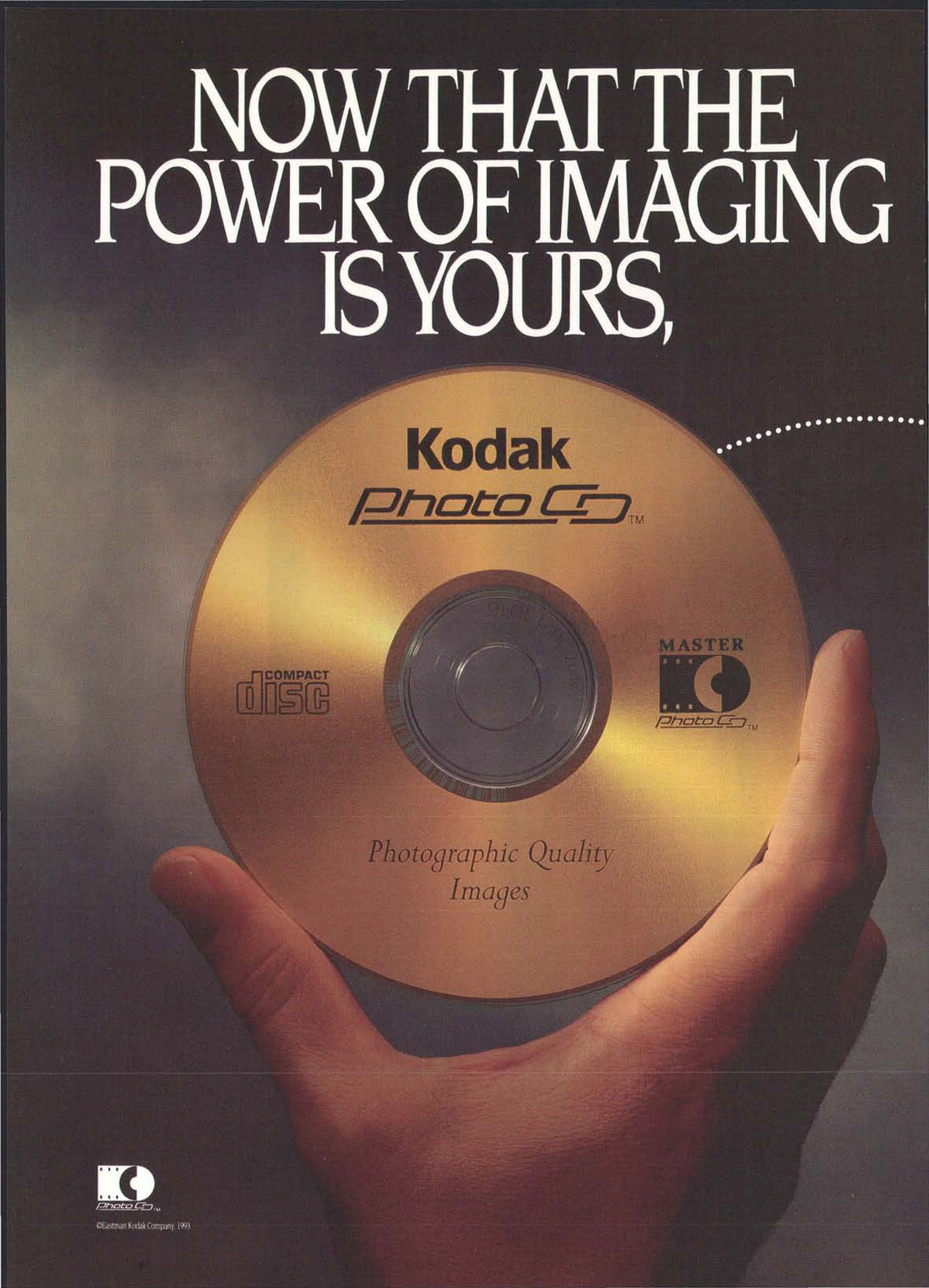

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News

Photoshop Gets Faster

Adobe is upgrading its photo-editing tool Photoshop to version 2.5, giving it much greater speed for many common tasks and a set of new features.

Two factors contribute to greater speed: a rewritten engine and what Adobe calls subsampling, which lets users experiment on a low-resolution version of an image, applying a complete transformation only once.

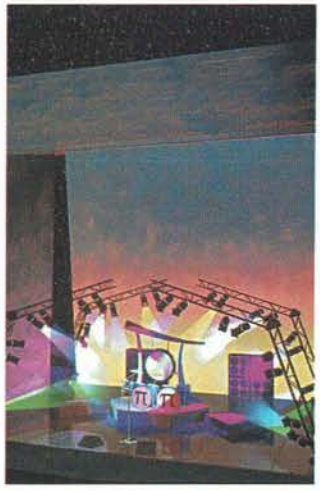
In the new-feature department: dodge and burn tools to lighten and darken selected parts of an image; support for using any tool to create a selection and generate a mask; collapsible tool palettes; support for an unlimited number of brush shapes; strokable and editable paths; a channel-editing dialog box; and Photo CD and JPEG support.

Photoshop's price is unchanged at $895. Adobe, 415/961-4400.—D.L.

Animated Electricity

The high-end animation and rendering package ElectricImage Animation System (EIAS) is being upgraded to version 1.5. New rendering capabilities include shadow casting from multiple lights, transparency and environment mapping, along with tubular, foggy, and several kinds of glow lights for lighting scenes. The animation module adds many high-end features including a choice between a spreadsheet or a time-line interface; motion triggered by events; support for hierarchically linking lights and cameras to moving objects; and the ability to link objects temporarily—useful, for example, to animate a person picking up an object and then setting it down. A new project window is designed for editing animations by frame or by time.

EIAS lacks a modeler, so users must create objects in another program and import them (EIAS imports almost anything). EIAS is copy-protected and costs $7495 from Electric Image, 818/577-1627.—D.L.



PREPARING FOR A VIRTUAL CONCERT: STAGE MOCK-UP CREATED IN ELECTRIC IMAGE.

TREND

Pinnacle's Paperless One

Distressed by the amount of paper your office consumes every day? Pinnacle Micro Imaging, a new division of Pinnacle Micro, claims to have a relatively fast, affordable solution with its new Paperless 1 Imaging System.

The system includes an automatic scanner, a rewritable optical drive, a 600MB disc, and an operating system. Users scan in documents or images at about 15 seconds per page, and can save multiple documents as a group or as individual files for later retrieval over a network. The software doesn't support optical character recognition, so scanned images of paper documents aren't searchable or editable as text files, but they can be retrieved using file names and keywords. To cut down on storage overhead, the system saves only a single copy of each document or image, transmitting pointers to the file rather than transmitting the file itself when multiple copies are needed.

SEAN SULLIVAN

THE PAPERLESS 1 IMAGING SYSTEM INCLUDES AN OPTICAL DRIVE AND AN AUTOFEED SCANNER.

The Paperless 1 Operating Software supports administrative functions, password security, template (forms) design, and electronic mail. The entire system lists for $6995, including all hardware and software. Additional scanners, drives, and discs can be added as needed. The company says the Paperless 1 Imaging System should ship by the end of January. Pinnacle Micro Imaging, 714/727-3300.—T.M.

In Control's Calendar

When the first version of In Control shipped it was resolutely anticalendar and totally unlike anything calling itself a PIM (personal information manager). Instead, it merged an outliner's usefulness in planning with the control over information provided by the row-and-column structure of a flat-file database.

Between versions 1 and 2, Attain Software realized that people have not only things to do but times to do them: In Control 2 merges a calendar and to-do list into the outliner/database. The new version also adds FileMaker-like scripts, more control over the report-generator's printing capabilities, and improved searching.

In Control's price remains $129.95. Attain Software, 617/776-1110.—D.L.

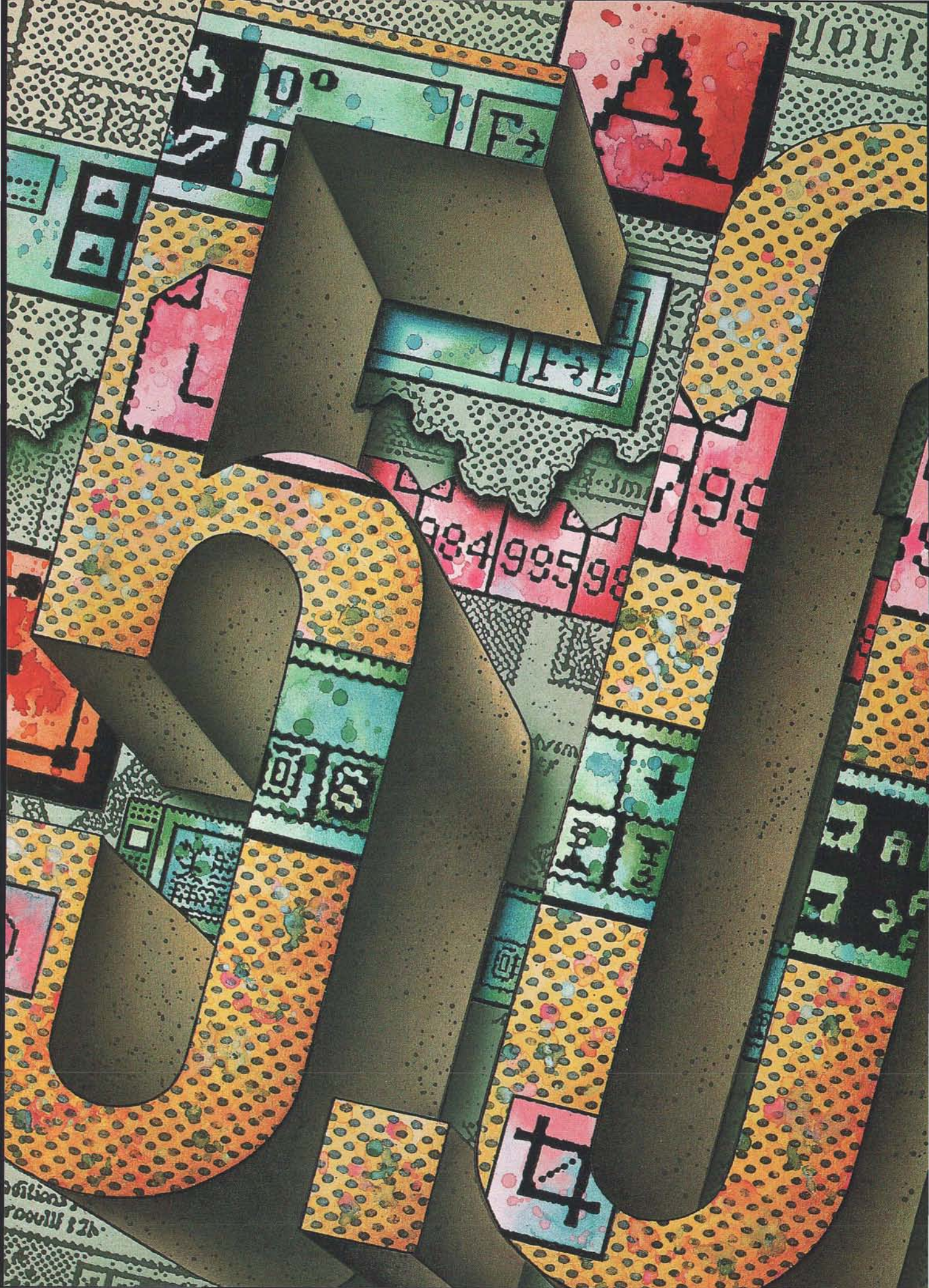
DRAGGING A TO-DO ITEM IN IN CONTROL'S CALENDAR. COMPLETED ITEMS CAN BE MARKED OFF IN A CHECK BOX.

Stacking SCSI Drives

Envisio's SmartStack is a new approach to adding up to seven external SCSI drives without cluttering your desk with a lot of boxes, SCSI cables, and power cords. The subsystem is built on the SmartSource base unit, which contains a fan, a 120-watt power supply, and two 50-pin SCSI connectors. The power supply drives all the devices in the SmartStack. The SCSI connectors plug into the first drive module, which has its own pass-through SCSI connectors for the next drive to plug into. A cover unit contains a cable that links the two connectors on the highest drive to each other, closing the SCSI loop. The cover unit also contains a second fan for more cooling.

THE SMARTSTACK FROM ENVISIO CAN STACK AS MANY AS SEVEN SCSI MODULES.

The first SmartStack modules will include hard drives, erasable optical drives, and DAT drives (one device per module). Envisio is working on modules for devices such as modems, SCSI-to-Ethernet controllers, and CD ROM drives. The first hard drive modules will range in capacity from 105MB to 1GB. The SmartSource base unit and cover will retail for $249. A 127MB module will list for $699, while a 1GB module will be $2649. SmartStack was slated to begin shipping in January. Envisio, 612/339-1008.—T.M.



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This is not your average mouse...

ADB Version for Macintosh® SE/II.

Meet MVP Mouse™ from Curtis.

One look tells you, MVP Mouse is not just another trackball. Its ergonomic 3-button design responds to your every impulse as if it were an extension of your hand. Its 200 DPI resolution and automatic acceleration give you pin-point cursor control *plus* the ability to "jump" across the screen with just a short, quick movement of your fingers. And its powerful control panel lets you select preset tracking and double-click speeds . . . or create your own! And it gives you dozens of button functions to choose from, including a Custom Command that simulates any ⌘-(letter) keyboard command.

You can assign any command to any button, quickly and easily on-screen. Optional Foot Switch acts as 4th command button.

Actual size

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For the Curtis dealer nearest you call (603) 532-4123, Ext. 42

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News

Using Your TV as a Monitor

Lapis Technologies has unveiled its L-TV, an NTSC interface board that lets LCs, LC II's, and Performa 400s use a standard television set as a monitor. The company uses convolution software to prevent the flickering of 1-pixel-thick lines that normally occurs when transferring a noninterlaced digital image to the interlaced analog display of a television. Lapis also includes its TV-Show presentation software, which lets a presenter control the presentation with an Apple 12-inch RGB display while using a television for the presentation itself.

THE L-TV BOARD FROM LAPIS LETS SOME MACS USE A STANDARD TV AS A MONITOR.

The L-TV board works in 1-, 2-, 4-, 8-, and 16-bit modes at resolutions up to 640 by 480. It offers a socket for a 68882 math chip. It connects to the television with a standard coaxial cable that can be up to 25 feet long, according to the company.

First shipments of the NTSC interface board began in November. The L-TV board has a suggested list price of $349. Lapis, 510/748-1600.—T.M.

VIRUS WATCH

CURRENT VIRUSES, TROJAN HORSES, AND WORMS

T4-A, T4-B

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: Initially discovered in a game called GoMoku
IMPACT: Both versions of T4 damage system files and applications

ChinaTalk

TYPE: Trojan Horse
FIRST LISTED IN VIRUS WATCH: 10/92
INFO: ChinaTalk is an INIT that comes with a read-me file that claims it provides a female voice for MacinTalk
IMPACT: Deletes the contents of disk drive on restart

INIT 1984

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/92
INFO: Infects INITs; becomes active only on Friday the 13ths
IMPACT: Destroys files and changes file and folder names and attributes to random garbage

Code 252

TYPE: Virus
FIRST LISTED IN VIRUS WATCH: 8/92
INFO: Displays a message telling user it is destroying contents of hard drive
IMPACT: After displaying message, it deletes itself without causing damage; infected Macs may behave erratically

Learning to Market

American Demographics magazine has published SMARTdisk, or Strategic Market Analysis Resources and Techniques, a $189 primer on market analysis.

Topics covered in the primer include how to use demographics to segment and target certain markets; how to choose advertising media based on consumers' life-styles; and where to open a new retail or service business.

SMARTdisk also looks at long-term consumer trends that affect marketing, and provides a list of sources for demographic data, computer-based market-analysis systems, and books (with ready-to-print order forms) on marketing topics including how to market to the elderly or to the environmentally conscious and how to prepare for long-term real estate trends. *American Demographics* is at 607/273-6343.—D.L.

Great Plains' New Plans

Great Plains is making a big move for the stodgy accounting software business: it is bringing out a new product line with a graphical user interface.

The new Great Plains Dynamics products divide up accounting into small, specific modules. For example, the financial series starts with a general ledger and has add-ons for cash, multiple currencies, financial analysis, and consolidating subsidiaries. Other series provide inventory, payroll, sales, and purchasing modules. A report writer is built in, and users can alter a form's appearance without breaking its underlying logic. Programming tools for real developers can produce Mac- and Windows-compatible systems. Pricing for Dynamics modules varies widely.

DOROTHY CARICO SMITH

Great Plains says it will maintain its traditional character-based products and plans to publish version 7, a major upgrade of Great Plains Accounting, sometime in mid-1993. Great Plains Software, 701/281-0550.—D.L.

TREND

Envisio Dock for Duos

Designed to provide portable expansion capability for PowerBook Duo systems, the Dynamic Duo from Envisio is a very small and inexpensive docking station. The main feature of the Dynamic Duo is its 16-bit color graphics adapter, which supports 32,000 colors on 12-inch or 13-inch monitors and 256 colors on 16-inch monitors. It's compatible with Apple monitors measuring from 12 inches to 16 inches diagonally, and with the Radius Color Pivot monitor. The Dynamic Duo also works with VGA monitors and LCD projection panels.

The docking station, which is about the size of a deck of cards and weighs about 5 ounces, adds 16-bit stereo sound capability to a Duo notebook system. An optional NTSC television adapter can be added to the Dynamic Duo. Slated to ship in January, the Dynamic Duo will carry a list price of $600. Envisio, 612/339-1008.—T.M.

WITH TIMBUKTU 5.0, YOU CAN WATCH THE SCREEN OF A WINDOWS MACHINE FROM YOUR MAC OR TAKE CONTROL OF IT.

Timbuktu Talks to Windows

Timbuktu allows you to look over a network to watch a remote Mac's screen, transfer files back and forth, use the remote Mac's printers, or even take control over it, using your mouse on its screen. Timbuktu version 5.0 lets Macs and machines running Windows perform all those functions.

Timbuktu manages file naming for transferred files. It runs on any AppleTalk-compatible network, including Ethernet and token ring. Version 5.0 comes as a desk accessory for System 6 and as an application for System 7. Under System 7, connection files can be saved and reused to automate log-ons.

Timbuktu 5.0 lists for $199 per machine; pricing is less per unit for multiple copies. Farallon, 510/596-9100.—D.L.

If this reminds you of your PowerBook after an hour or so, make its battery charge last up to twice as long with The Norton Essentials™ for PowerBook. It increases battery charge, makes your PowerBook easier to use, and keeps files synchronized -- all without sacrificing performance. To learn more, dial FAST FAX 1-800-554-4403.*

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News

Inventing Medicine

Stumbling upon new medicines has long been a matter of a chemist's intuition and some lucky guesswork, but new software called Catalyst is intended to make inventing medicines a systematic process.

Catalyst can import a 2-D model of a molecule from standard chemical databases and show it in both 2-D and 3-D views. Chemists can click and drag to add atoms and reconfigure the molecule, while Catalyst validates the new molecule's bonds and structure and makes sure its folding fits biological constraints. Catalyst can search a 2-D database for molecules whose 3-D configurations fit into a certain receptor the chemist is trying to match, or the program can perform searches based on abstract criteria such as "greasiness" and charge.

A workbench metaphor emulates a chemist managing a laboratory's work flow, and a special command can clean up sloppily constructed molecules for publication. Catalyst runs on Mac–Silicon Graphics networks; the SGI machine does the serious number-crunching. Catalyst is $30,000 per user from BioCAD, 415/903-3900.—D.L.

BUG REPORT

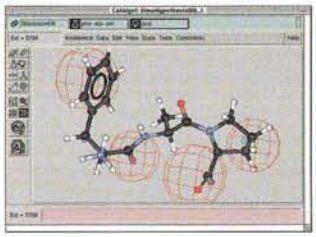
Aldus Persuasion 2.12 Text can move out of place when files are converted from version 2.0 to version 2.1. Aldus says this is caused by switching from line-based leading to more accurate point-based leading, and cannot be fixed.

Now Utilities 4.0 Now Menus disables menus in some applications. The problem is fixed in version 4.01, available free online or for $6 by mail to registered users on request.

Microsoft Excel 4.0 The add-in function RANDBETWEEN is supposed to generate evenly distributed random integers, but it generates too few of the lowest integers in the range.

If you save an Excel file as a text file, numbers in any column with a width of zero disappear (but letters in zero-width columns survive). Microsoft says it has no immediate plans to release a bug-fix for Excel.

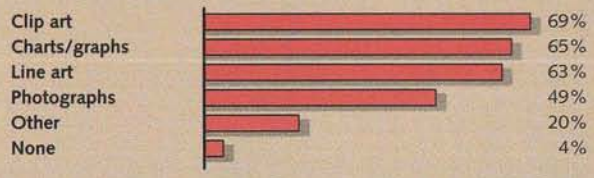
***MACWORLD* WILL SEND YOU A BUG REPORT T-SHIRT IF YOU ARE THE FIRST PERSON TO INFORM US OF A SERIOUS, REPRODUCIBLE BUG THAT WE REPORT IN THIS COLUMN. SEE *HOW TO CONTACT MACWORLD*.**



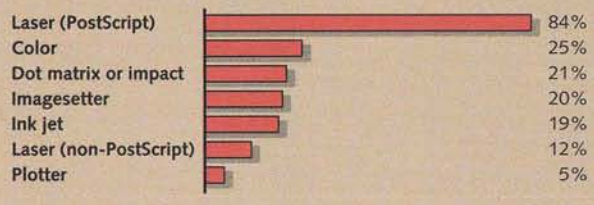
CATALYST. MESH SPHERES SHOW WHERE A CHEMIST'S MODEL CORRESPONDS TO ATOMS OF A REAL MOLECULE.

Survey: Desktop Publishing

What types of graphics do you use in your DTP files?



How do you output your DTP files?



Based on 381 respondents to a 1992 *Macworld* reader survey who use publishing software on a Macintosh. Multiple responses were allowed.

Software Hooks PowerBooks to Nets

Farallon Computing has come up with two related software products for linking AppleTalk devices to Ethernet networks or token ring networks without an expensive router. LocalPath works with AppleTalk devices in general, while PowerPath lets you connect a PowerBook to a network.

With LocalPath, you can connect a net of up to eight LocalTalk devices to a host Macintosh. LocalPath runs in the background while accessing an Ethernet or token ring network. The host Macintosh slows slightly, but can still be used for normal applications, according to Farallon.

The PowerPath application works the same way, but it's intended for adding a single PowerBook to the network. Both LocalPath and PowerPath use forwarding software technology, essentially a forwarding engine that eliminates routing tables and other network-management overhead.

LocalPath lists for $199 and PowerPath lists for $149 including connectors. Both products began shipping in November. Farallon, 510/596-9100.—T.M.

TREND

Stripping: The Final Frontier

Stripping—positioning the film for individual pages so that signatures are printed, folded, bound, and trimmed correctly—is the most labor-intensive and most computer-resistant step in the prepress process. Ultimate Technologies' goal with Impostrip is to bring stripping into the modern era, out of the darkroom and onto the Mac, to eliminate tedious and time-consuming hand labor.

In Impostrip's job-setup window you describe how many pages a print job is, the trim size, the binding, and so on, and in the signature-setup window you describe the press size, margins, gripper area, and other details. Impostrip then imports the files—it supports PostScript files created by most publishing software from PageMaker or QuarkXPress to Xyvision and Tex—and runs out camera-ready imagesetter film. Price ranges from $1995 to $29,995 based on the number of import filters. Ultimate Technologies, 514/954-9050.—D.L.

DRAKE SORFY

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MacRecorder Sound System Pro. Turns your Mac into a complete audio workshop! Record, edit and play back live or recorded sound to add enormous impact to multimedia presentations, training materials and documents with voices, music and sound effects. Nothing smacks an audience like great sound — it keeps them right there!

The MacRecorder Sound System Pro digitizer features a built-in microphone, external microphone jack, line input jack and input level control. Just plug the digitizer into your Mac's printer or modem port, open the mic and start recording! The software included, called SoundEdit Pro, acts as your mixing board to create soundtracks, voice-over narrations and great sound effects. The sound appears on your screen as a waveform for easy editing. Cut and paste sound clips (just like cutting and pasting text) and modify sounds with a host of creative tools to create intriguing effects. Mix multiple tracks of music, sound effects, and voices to produce pro-quality, multi-track soundtracks for your presentations, interactive applications and more.

Magic — Multimedia Made Easy! Magic is appropriately named. Creating pro-quality multimedia productions is almost automatic! Create objects with MacDraw-like simplicity, make them move along paths that you draw in seconds — lines, curves, circles and rectangles. Click and drag to change paths for custom movement. Great for animated bar, line and area charts and procedure flows. When you want to see what the animation looks like, just click "play." And Magic enables you to create run-time versions of your productions to distribute to others, along with a 2-disk ClipMedia sampler that includes music, backgrounds and animations.

Incredible colors, unbelievable resolution and striking output. This example uses stylized and rendered type as part of the design. Images so lifelike, they are real — amazing capabilities.

NEW! DIRECTOR 3.1! Macromedia has packed a host of great new features into version 3.1, including enhancements to importing, interactive playback and exporting of QuickTime movies. Version 3.1 runs swifter than before, thanks to a new version of MacroMind Accelerator included FREE — formerly sold separately for $195. MacroMind Accelerator also smooths out animations. There's also an expanded Object Sensitive Help System.

With QuickTime, Director 3.1 really explodes with opportunities. New features enable you to easily integrate QuickTime movies into interactive MacroMind Director productions — edit, playback and export QuickTime movies from Director files without any additional hardware, and import QuickTime movies as cast members!

Swivel 3D Professional 2.0. Swivel 3D Professional 2.0 is superbly designed, with an interface that enables you to move with blistering speed. Build amazing 3-D scenes with uncanny realism and almost effortless object handling. In fact, NASA relies on Swivel 3D Professional for scientific visualization, concept modeling and idea development. For print applications, Swivel 3D Professional exports Adobe Illustrator format, so views of models can be edited directly in Illustrator. Joe Lertola of TIME Magazine uses this method to create many of his infographics.

Rendering and output capabilities include fast, incredibly smooth shading, 24-bit color output capability, 24-bit image mapping, 8 independent light sources, environmental mapping, spectacular highlighting, RenderMan RIB output and AutoCAD DFX output.

ModelShop II. Why not present your spatial design ideas in amazing 3-D?! Architects and designers are pouring it on with this amazing sketch and rendering tool that produces realistic models with incredible speed, pinpoint-precision and remarkable flexibility. Even the most complex models can be constructed using ModelShop II's 2-D and 3-D objects (including cuboids, cylinders, walls, arcs, polygons and more). Light and shadows are completely at your command: adjust intensity, color and add an unlimited number of point and spotlights. Drawing and re-drawing is faster with ModelShop II's Layering.

ModelShop II includes an extensive library of elements (including many city locations) that can be added to your models in a snap.

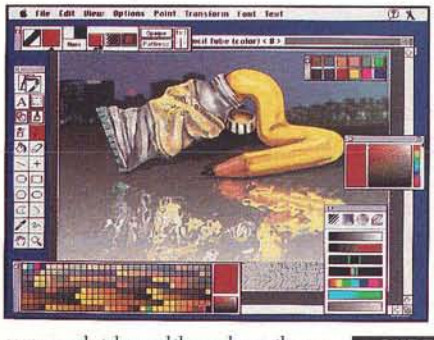
Life Forms. Create sophisticated human motion animations with this new, easy-to-use package. Access shape libraries of figures in sitting, standing, jumping, sports and dance poses, and more. Life Forms automatically creates smooth human motion between any two positions you define. Add natural human motion to *Swivel 3D*, *MacroMind Three-D* and *Director* productions. Save motion sequences as QuickTime movies.

MACROMEDIA	
BDH2559 **MacRecorder Pro**	$249.95
BDH2560 **Magic**	$279.95
BDH2561 **Director 3.1**	$749.95
BDH2554 **SwivelMan** (With MacRenderMan)	$625.95
BDH2555 **ModelShop II**	$625.95
BDH2556 **LifeForms**	$359.95

If Picasso, M.C. Escher And Ansel Adams Wrote A Software Program Together...

The all-new Aldus SuperPaint — Version 3.5 — combines superior, easy-to-use painting, drawing and image processing into one complete package. You can use it to create stunning business graphics, fabulous designs and unforgettable color images — without working in separate programs. And believe it or not, you can access 16.8 million colors without 24-bit hardware!

This is another Aldus award winner, enabling designers and businesspeople to communicate ideas with a palette of advanced tools and powerful functions. Combine the spontaneous expression of painting with the precise accuracy of drawing to create spectacular office forms, reports, presentations, brochures, illustrations and even the most complex charts. SuperPaint enables you to scan your sketches and then enhance them — or work from start to finish on-screen. Turn images into textures, mask and/or fill selected areas, and turn ordinary images into breathtaking works of electronic art.

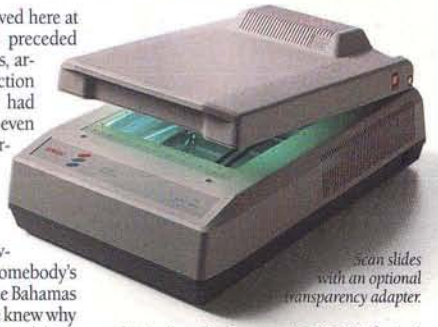


Of particular note is SuperPaint's ability to include high-resolution text in the draw layer (previously only a designer's dream), the ability to create beautiful gradients — blending up to 256 colors! Also allows you to import/export TIFF and EPS images — even scan images directly into the program (images can be of any size, even with limited RAM; SuperPaint works with large images in virtual mode). SuperPaint is the ideal tool for creating images for presentations and on-screen demos. Complex charts leap to life with stunning color, scaling and transformations.

SUPERPAINT VERSION 3.5	
BDH2604 **Aldus SuperPaint New Version 3.5**	$133.90

THE BILLION-COLOR SCANNER!

When the UMAX scanners arrived here at Tiger, their reputation had preceded them. We knew that top designers, architects, artists, pre-press production houses and commercial printers had UMAX flatbeds. A few of us had even seen a UMAX in action. What surprised us was the prices. This low?!



Scan slides with an optional transparency adapter.

After plugging in the awesome UMAX UC1200S, and scanning a couple of magazine covers, glossy posters, a snapshot of somebody's baby, a 35mm slide of my trip to The Bahamas and our color matching chart — we knew why so many pros use the UMAX. They deliver one-pass, reproduction-quality scans at 1200 dpi! Drenched colors, razor-sharp detail. But the price... How can a product with such a reputation carry such a modest price tag?

UMAX scanners come in a variety of flavors, from a compact, 600 dpi speedster to the top of the line, 1200 dpi hellcat that delivers blistering color scans — it recognizes a billion colors! Rivals the legendary drum scanning technology — at hundreds of thousands less!

Color, black & white, grayscale, halftone — do it all with the amazing UMAX flatbed scanners. For office use, the UMAX black & white scanners pump out 600 dpi images. Feature for feature, nothing outclasses or outperforms UMAX's advanced technology. Great for OCR, handsome desktop design.

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ACT! is the best-selling contact management software (fully System 7 compatible) that puts you squarely in control of clients, vendors, friends and associates. That's what the pros demand. ACT! includes a Contact Manager, Activity Scheduler, Word Processor, Report Generator, To-Do List Manager and Auto Dialer — all rolled into one very sleek, very fast and very easy to use program.

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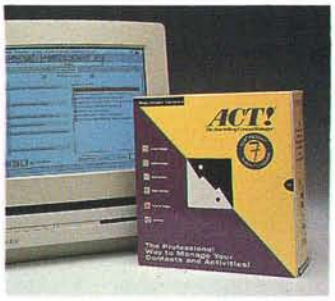

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Here it is, Star Trek fans! A screen saver that pumps out stunning images right from the TV series: Captain Kirk, The Enterprise, crewmembers and those fabulous Tribbles, from that unforgettable episode. Prevent burn-in with new Star Trek: The Screen Saver.

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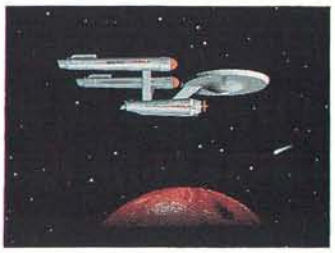
AFTER DARK AND MORE AFTER DARK....



BERKELEY SYSTEMS

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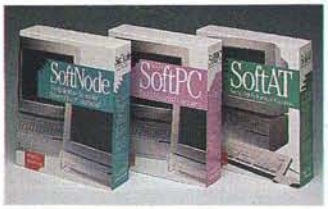
Run MS-DOS Software On Your MAC!

At last! The great barrier between Mac and DOS compatibility has been removed — for good. As users of both Mac and DOS computers, we know the pros and cons. Macs are friendly and advanced, but the DOS world has more people creating more specialized software. Plus, today's office environment uses a mix of DOS and Mac computers. This plays havoc with spreadsheet and data files which need to flow smoothly between Mac and DOS PCs. That's why Tiger is proud to offer the world's best-selling answer from Insignia Solutions. They're the best. They have a solution to fit every need and every Mac. And best of all — it's software only! No expensive hardware to buy or install.



Turn any Mac into a DOS PC. Run actual DOS applications: 1-2-3, ProComm Plus, dBase — virtually any DOS application — from inside a Mac window. Cut & Paste between Mac and DOS windows. Save, copy and print right from your DOS application. Run your favorite DOS application just like it was running on any DOS 286 PC. You can have the best of both worlds: the fast, easy Mac interface you've come to know, and a huge world of specialized DOS software that fits every known need.

Run a DOS program and print directly to any PC printer or Mac printer — just like it was an industry-standard Epson LQ2500 (which virtually all DOS programs support). Or if the DOS program supports Postscript printers, you can print directly to any LaserWriter or other Mac PostScript printer. TrueType fonts are even included for the Epson LQ2500 so you get crisp, clean printouts every time.

There are three members of the SoftPC family, each designed to take advantage of the wide range of different Macs:

Entry Level SoftPC. This member of the SoftPC family was designed for low-cost Macs including the Mac Plus, SE, Classic and Powerbook 100. Recommended for Textual based DOS programs. You get everything mentioned above including IBM AT 286 emulation, DOS 3.3 and CGA graphics.

Universal SoftPC. Step up to Universal SoftPC and you add several new capabilities to the Entry Level SoftPC package. Universal SoftPC runs on any Mac. CD-ROM support lets your Mac CD reader play DOS CDs. Recommended for Textural based DOS programs.

SoftAT. Fasten your seatbelt and hang on as SoftAT takes DOS software to new levels of high-performance. You need a Mac LC, SE30, Mac II, si, ci, cx, fx, Quadra or PowerBook 140 or 170 to run it, but it's all speed. You get lightning-fast benefits like a Math Co-processor, EGA graphics for more demanding graphics applications, and Expanded memory for big, hungry applications. SoftAT is the ultimate answer to Mac and DOS compatibility.

SoftNode. Another Insignia Solutions breakthrough is SoftNode — the perfect solution for running Novell Netware PC client software on any Mac. With the addition of the SoftNode add-on, both Universal SoftPC and SoftAT can run off-the-shelf and customized MS-DOS programs on any Mac.

INCLUDED FREE

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Read DOS Disks, Floppies and Externals!

Here's a solution that solves forever the problem of Mac & DOS incompatibility. Need to use a co-worker's DOS floppy with their DOS 1-2-3 file on your Mac? No problem. Simply slip it in and watch as that DOS floppy appears just like any Mac floppy — complete with icons and folders. Amazing! But that's not all. Double-click on that DOS 1-2-3 file and stare in amazement as 1-2-3 Mac or Excel starts up automatically and loads that DOS file! You can make changes, save it, give it back to your DOS-using co-worker, and then chuckle as he loads the file with your changes.

Slip any DOS floppy into your Mac and it looks just like a Mac floppy! An icon appears, you double-click it and DOS files and sub-directories appear just like the were Mac files and folders. Double-click on the DOS files and immediately run Mac applications like Word, 1-2-3 Mac and Excel. AccessPC is still the fastest — fully 4 to 10 times faster than the competition!

Now with Cartridge and Magneto-Optical Drive Support! AccessPC is instantly compatible with your external cartridge and magneto-optical drives. No other utility software is needed! (Unlike the others that make you call your drive manufacturer for software they haven't even finished yet.) Your DOS files are ready, willing and able with the finest DOS file access application made — AccessPC.

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ACCESS PC

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All programs require either SuperDrive or Drive capable of reading DOS Disks.

The right add-ons can transform your notebook Mac into a complete desktop system

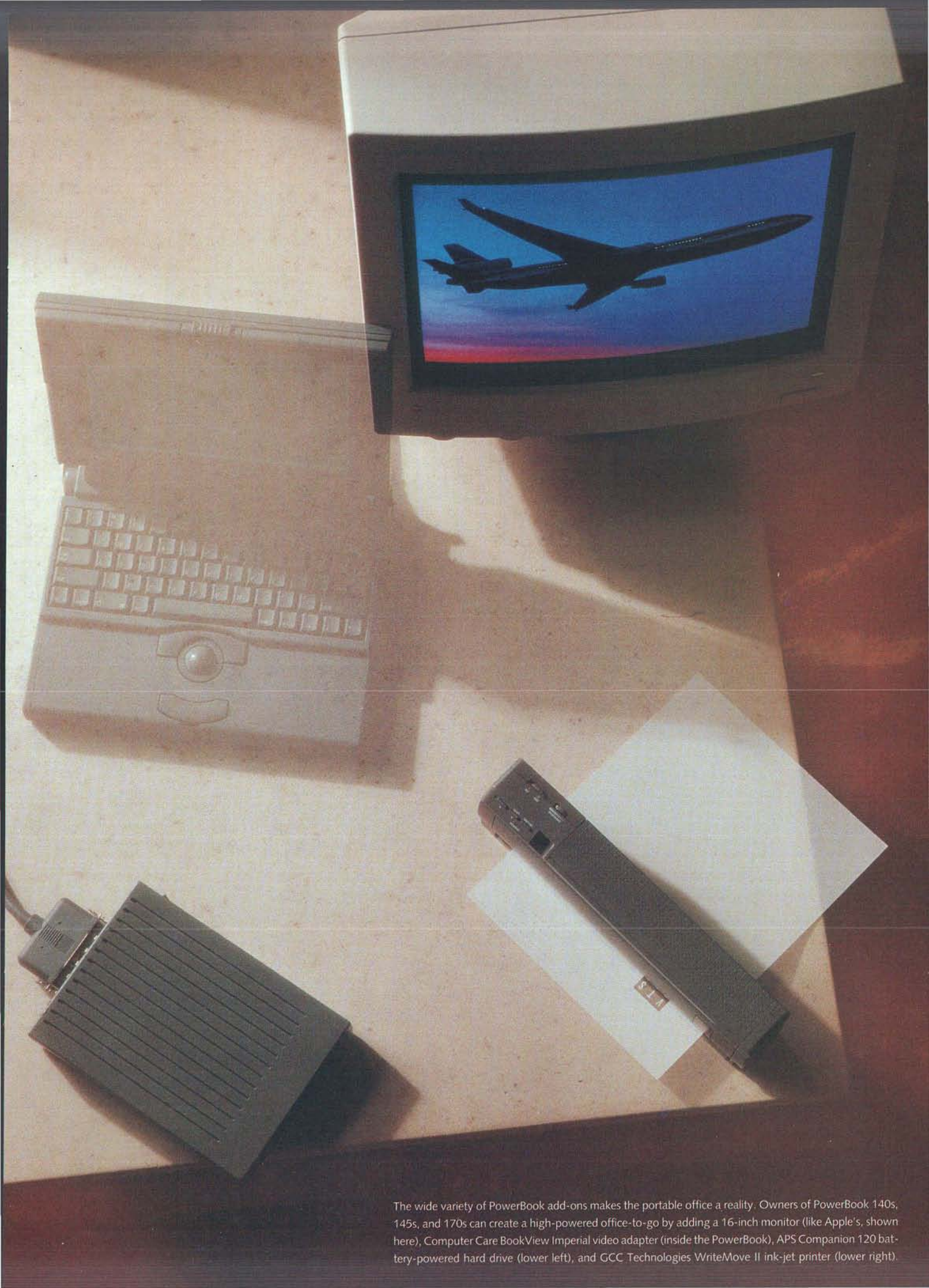
Thanks to notebook-size Macintoshes, you can take your computer—and your work—across the street, across the country, or around the world. But a notebook need no longer be a secondary Mac used only for travel; with the recent availability of a host of add-ons, now it can be your main computer. As you build your portable office, you'll be confronted by a wide array of products that promise to make your life easier both at the office and on the road. Some products live up to their billing; others should be left by the wayside. A battery of subjective evaluations by *Macworld* editors and objective tests by Macworld Lab separate the must-haves from the need-nots.

EXPANDING YOUR POWERBOOK

Before you choose from a selection of tools, you must first identify which tools you need. This can be difficult, given the newness of portable peripherals and the variety of notebook Macs. For example, three types of options are available to connect external video to the first-generation PowerBooks—the 100, 140, 145, and 170. While the second-generation PowerBooks—the 160 and 180—don't need video options because they have built-in video ports, they still benefit from some of the other portable options, like fax modems and portable printers. The Outbound Notebook Systems notebook Macs, from Outbound Systems, are similar to the first-generation PowerBooks, except that the Outbounds support fewer video options but have more-flexible upgrade capabilities (see *Reviews*, *Macworld*, September 1992). And the new Apple subnotebooks—the PowerBook Duo 210 and 230—have an entirely different set of options because of their unique docking-station design. One size definitely does not fit all. Use our "Notebook-Compatibility Guide" to see which tools work with which types of notebook Macs.

By Tom Negrino

PHOTOGRAPHY BY PAUL FRANZ-MOORE / SCREEN IMAGE BY GEORGE HALL



The wide variety of PowerBook add-ons makes the portable office a reality. Owners of PowerBook 140s, 145s, and 170s can create a high-powered office-to-go by adding a 16-inch monitor (like Apple's, shown here), Computer Care BookView Imperial video adapter (inside the PowerBook), APS Companion 120 battery-powered hard drive (lower left), and GCC Technologies WriteMove II ink-jet printer (lower right).

Improve Your Memory

MORE MEMORY IS A MUST FOR MOST PEOple—4MB should be a minimum standard for spreadsheet and word processing users, 8MB for graphics and engineering users and for those who often switch between multiple open applications.

The PowerBooks, Duos, and Outbounds each use a different type of memory chip. All the PowerBooks except the Duos use low-power pseudostatic RAM chips. They come in several sizes: 2MB, 4MB, and 6MB.

The first-generation PowerBooks that come with 4MB of RAM from Apple have 2MB soldered onto the logic board and a 2MB board in the RAM slot, so to expand to 6MB or 8MB, you have to remove the Apple 2MB RAM board and substitute a 4MB or 6MB board. Some older third-party RAM boards have pass-through connectors so you can plug more RAM into them—but because of space limitations and safety considerations, Apple is discouraging developers from using pass-through connectors.

The Duos use low-power dynamic-RAM chips in special SIMMs. And the Outbounds use standard dynamic-RAM SIMMs—just make sure that you do not mix SIMMs of different speeds.

If you follow three simple rules, you can't go wrong in purchasing memory.

First, if you own a first-generation PowerBook, you'll be best off if you upgrade to the maximum 8MB of RAM. Owners of other notebook Macs should also consider 8MB a minimum RAM configuration. The PowerBook 160 and 180 support as much as 14MB of RAM, while the PowerBook Duo 210 and 230 hold up to 24MB (4MB is the standard configuration). The Outbound 2030 and 2035 take up to 16MB of RAM, but applications can use only 4MB of RAM; the remaining 12MB becomes a RAM disk. Outbound's 2030E, 2030S, and 2030V also support 16MB, with up to 14MB for applications and the rest as a RAM disk. (A RAM disk is a large amount of RAM that is set aside for use as a temporary hard drive.)

One strong reason to get at least 8MB of RAM in any notebook is that you can create a RAM disk large enough to hold a System Folder and an application. (With a PowerBook, use the Memory control panel to create a RAM disk. On an Outbound, look for the Silicon control panel.) Making the RAM disk the start-up device and then restarting gives you a notebook that hardly ever needs to spin up the hard drive, thereby significantly extending your battery life.

Second, buy based on price. As long as you get the right kind of RAM for your notebook and it has a lifetime warranty, search for the lowest price. For example, a survey of prices advertised in recent issues of industry magazines showed a range of $199 to $299 for a 6MB memory board for the first-generation PowerBooks. Check publications like *Macworld*, *Computer Shopper*, and regional computer papers, as well as your local dealers, for the best prices. Factor in the charge for having your local Apple dealer install the RAM; typical fees range from $30 to $75.

Third, if you have a PowerBook or an Outbound, get your dealer to do the upgrade—neither Apple nor Outbound recommend user installation (although it is easy to do on an Outbound). If you have a Duo, you can upgrade the RAM yourself, but unless you're technically inclined, rely on your dealer there, too.

FOR ANY NOTEBOOK MAC, CONSIDER 8MB TO BE THE MINIMUM RAM CONFIGURATION

Never Too Much Storage

THERE ARE AS MANY DRIVE OPTIONS for notebooks as there are working styles. You can replace your internal drive with a larger one (as large as 120MB for the PowerBooks and 220MB for the Outbounds) or add an external drive. If you choose an external drive, you can get one powered through a standard AC plug, via a battery, or through the notebook's ADB port. We looked at external drives that have either battery or ADB-power options.

There are two fine internal drive mechanisms to which you can upgrade, and more are coming soon. Quantum's 2½-inch Go drives come in 80MB and 120MB sizes, and either one is a good choice. Several vendors sell the Go drives under their own label, including APS Technologies, FWB (415/474-8055), La Cie, Mass Mi-

Designing a Portable Office

A notebook Mac with its standard array of features could suffice as your primary Mac—after all, it comes with a screen, keyboard, trackball, hard drive, floppy drive, and standard Mac connectors. But the truth is, it's probably not enough.

For starters, you're likely to want more RAM than your notebook came with. Bump your machine's RAM up to 8MB, because the advantages far outweigh the expense.

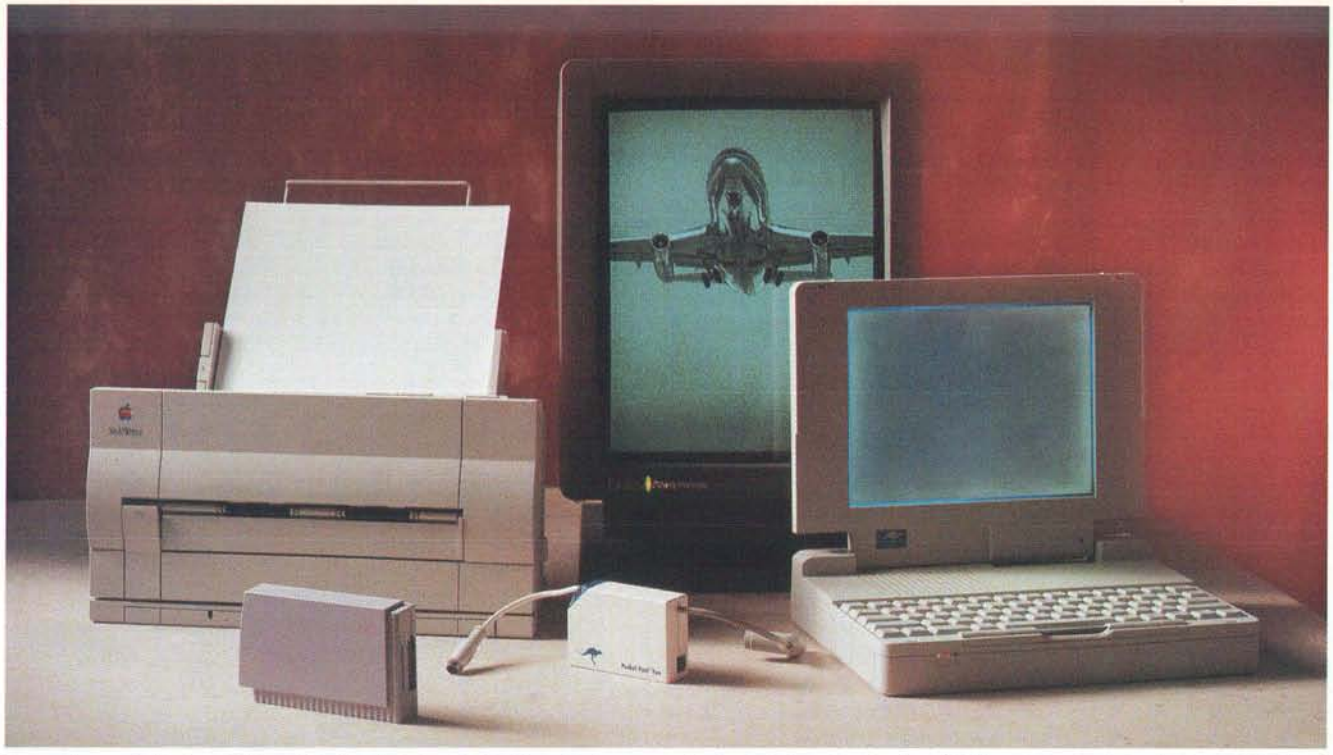
You're also likely to want more disk space than the 40MB that most first-generation PowerBooks came with. You can upgrade the internal drive or add an external one. Which option you pick depends on whether you travel and want to keep your archives safely at your desk instead or take them with you on the road.

Unless you have a 170 or 180, with an active matrix LCD screen, you'll quickly find that the passive matrix screen is tiring to use over the long term. So you should definitely get an external monitor. Even if you like your notebook's screen, you still may want a video-connection option so you can hook your Mac to a color monitor. (Note that the PowerBook 100 or an Outbound is limited to eight colors because these notebooks use older Mac ROMs, ones without color QuickDraw.)

A modem—either internal or external—completes the list of standard features for a portable office. Spend the extra money for a fax modem—even if you have a fax machine—since you can use the fax capabilities on the road, either for traditional faxing or last-resort printing.

Chances are that you can take advantage of more than just basic equipment. If you travel, you may want a portable printer. If you work half the time on the road and half the time at the company's offices, or if you rove from one branch office to another, you'll want to be able to connect to your company's network and peripherals directly through an AppleTalk or Ethernet network. And thanks to the SCSI, ADB, and serial ports available on all notebook Macs except the Duos, you can connect to any standard Mac peripheral, whether it be a CD ROM drive, mouse, or modem. For the Duos, the revolutionary docking stations add flexible, convenient connectivity.

There are also a host of odds and ends a notebook office might contain, such as carrying cases, batteries, battery chargers, numeric keypads, and locks. David Pogue covered many of these options in "The Case (etc.) for the PowerBook," *The Desktop Critic, Macworld,* September 1992. Other such products are reviewed in *Macworld*'s new *PowerBook Notes* column, which debuts in this issue.—GALEN GRUMAN



For people on a budget, an Outbound Notebook System 2030S, Sigma Designs Power Portrait SCSI monitor, Apple StyleWriter printer, La Cie PocketDrive 120MB hard drive, and Outbound Pocket Port Fax Modem (counterclockwise from right) make up a capable portable office.

crosystems, and Microtech (203/468-6223). Macworld Lab tests show minimal differences in performance among the drives tested (since their mechanisms are the same), so base your Go drive buying decision on price and service. By the time you read this, Fujitsu and Conner Peripherals should also have drives available for vendors to package into portable drives.

Outbound owners have more capacity options—up to 220MB—as well as the option of using new removable drives that let you share a notebook among several people while keeping each person's applications and data separate and secure.

External drives give you the same separateness and security as removable drives, plus they work with any Mac. The La Cie PocketDrive is a good example of an external drive. Small enough to fit into a shirt pocket (hence the name), the PocketDrives come in 40MB ($348), 80MB ($598), and 120MB ($698) sizes. They plug into one of two SCSI connectors: the included T-Connector, which attaches directly to the SCSI port on the back of a desktop Mac, or La Cie's $99 PocketDock, which has a SCSI cable that lets you keep the dock where it's more accessible. Both connectors have a pass-through SCSI port so you can chain more SCSI peripherals.

Mass Microsystems and Mirror Technologies also sell portable external drives. Mirror also offers the $199 PowerDock battery-charger stand for its drives.

Power to the La Cie and Mass Microsystems drives is supplied by a connector to the ADB port or by an AC adapter. Because of the PowerBooks' limited power supply, La Cie recommends that its PocketDrives be used with an AC adapter (an additional $59) when used with a PowerBook. Mass Microsystems offers no AC adapter.

Drives based on the Go 80 are particularly susceptible to inconsistent performance when powered through an ADB connector. The Go 120 does not have this problem, and Quantum has recently developed the new Go 80 GRS that works reliably with the ADB's power output.

We liked the La Cie PocketDrive 120MB a lot. Weighing only about a pound, the PocketDrive and PocketDock fit into a briefcase without a bulge.

For drives that carry their own power, consider the Companion 80 ($499) and 120 ($599), battery-powered drives from APS Technologies. Housed in a slim case the same color as the PowerBook, these drives use the type of rechargeable battery found in radio-controlled model cars to power a Quantum Go 80 or Go 120 drive for up to six hours. Liberty Systems configures its 20 Series of drives with built-in batteries ($998 for the 80MB unit and $1198 for the 120MB unit). The Liberty drives let you daisy-chain other SCSI devices from them; APS drives must be the last or only external device on the SCSI chain.

Video Options

THE BIGGEST DRAWBACK TO THE FIRST-generation PowerBooks is that they lack a video-out port. While Apple has provided video output on the PowerBook 160 and 180 (and, via docking stations, on the PowerBook Duos), there are still about 350,000 older-PowerBook owners who need to turn to third-party options if they want to use a bigger or color screen, or an LCD projection panel.

Although the PowerBook 160 and 180 provide a video-out port, they are limited to 8-bit color on a 16-inch screen and cannot drive a 19-inch or 21-inch screen at all. Expect third parties to step in and beef up the video-output power of both of these machines by adding video RAM. At press time, Computer Care is planning a product that would let the PowerBook 160 and 180 produce 8-bit color on 19-inch monitors. The Aura Systems ScuzzyView video adapter also offers this functionality.

True to Apple's historical support for multiple-monitor display, all notebook video options let you have active the notebook's screen and an external display, to form a larger virtual screen. This is particularly helpful when you are making presentations: you control the presentation from your notebook, and your audience sees just the presentation itself on the external monitor. The PowerBook 160 and 180 and the Duos also support a video mode called *mirroring*, where the external video monitor shows the same image as the internal screen. This lets you and your audience see the same screen image, which is particularly helpful during demos.

Video options fall into three classes. First, there are monitors that hook directly to the SCSI port. Next come the SCSI video adapters, which work with a variety of regular monochrome and color monitors. These two types of video options can be used with the Outbound notebooks, as well as with the PowerBooks, and in fact,

with virtually any other Mac. And finally, there are video adapter boards that install in the PowerBook's memory socket.

SCSI monitors The SCSI monitors—monochrome portrait displays, with a video board built into the monitor housing, that connect to a Mac's SCSI port instead of a video port—are an all-in-one solution. They need no dealer installation, have no tangle of cables or adapter box to get in the way, and work with any Mac. But they are slower than a traditional monitor. This is not the fault of the displays themselves but is because they get video information through the SCSI port, which is slower than a video port. The slowdown is very noticeable in graphics, but the performance is acceptable for text-oriented work. SCSI displays can also be jerky when you scroll, since they can't send information fast enough to scroll both quickly and smoothly. All vendors but Sigma Designs offer two settings—smooth and normal mode—to let you decide which is more important to you. Be warned: Some of our scrolling tests took twice as long in smooth mode as in normal mode.

We tested four SCSI monitors: the $949 Outbound Systems Outrigger, the $999 Generation Systems PowerPlay, the $749 Mirror Technologies ViewPort, and the $749 Sigma Designs Power Portrait. All have two SCSI plugs, to allow for daisy-chaining additional peripherals. Hooking up all of these monitors is a snap: you plug the SCSI cable into the Mac and into the back of the monitor, drag a system extension to the System Folder, and restart. From then on, you deal with the second monitor in the usual way, using the standard Monitors control panel.

SOME OF OUR SCROLLING TESTS TOOK TWICE AS LONG IN SMOOTH MODE AS IN NORMAL MODE

The Outbound, Mirror, and Generation Systems monitors are all manufactured by Outbound Systems, so performance and operation are virtually identical for the three units. Unfortunately, that performance is mediocre. The units weren't especially fast in Macworld Lab's scrolling tests. And subjectively, the display was disappointing, as the picture tube has a marked, annoying curvature. The top and bottom edges of some screens we looked at had a noticeable bend called pincushioning—this was severe on some evaluation units but not on others.

We also had some odd problems with Outbound-based displays. Occasionally buttons in some application windows wouldn't appear until we passed the cursor over them, and sometimes the picture on the display would freeze, requiring a restart (see *Lab Notes*, this issue).

The Sigma Designs Power Portrait fared better both in the lab and in everyday use. The monitor has a flatter screen that makes it much easier on the eye. The screen phosphor was also whiter and thus more comfortable to read. You can set the screen resolution to 72 dpi, 80 dpi, or 88 dpi; the two higher resolutions let you fit more on the screen. There is no smooth mode, but the unit's inherently smooth scrolling means none is needed. The Power Portrait also has a hardware panning feature that creates a virtual two-page display with up to 1024 by 1024 pixels of display area. The Power Portrait is the best choice of the SCSI monitors tested.

MW LAB Portable Video Performance

	REAL-WORLD SPEED TESTS (in seconds)			LOW-LEVEL QUICKDRAW SPEED TESTS (speed compared to PowerBook 170 screen)	
	Vertical Scroll: Average results for a series of up and down scrolls (one line at a time) in Excel and Word documents.	Horizontal Scroll: Average results for a series of left and right scrolls (one column at a time) in Excel documents.	Page Scroll: Average results for a series of up and down scrolls (one screen at a time) in Word documents.	All Commands: Relative performance in processing all 118 QuickDraw commands, using the industry-standard Hydra benchmark	Basic Commands: Relative performance in processing 25 common QuickDraw commands, using the industry-standard Hydra benchmark.
Notebook Computers (Monochrome)					
Apple PowerBook 170*	20.2	16.8	9.2	100%	100%
Apple PowerBook 160 (13")	31.3	27.8	12.9	57%	66%
Apple PowerBook 160 (16")	43.2	40.5	12.2	57%	65%
Outbound Systems Outbound 2030S *	11.6	11.5	6.0	Incompatible with Hydra	Incompatible with Hydra
SCSI-Based Monochrome Monitors					
Generation Systems PowerPlay (15")	26.3	58.3	12.3	161%	216%
Lapis Technologies Full Page Portrait (15")	32.6	63.5	13.5	153%	206%
Mirror Technologies ViewPort (15")	26.4	58.4	12.2	161%	215%
Outbound Systems Outrigger (15")	26.2	58.4	12.3	163%	221%
Sigma Designs Power Portrait (15")**	36.3	76.2	19.4	193%	341%
Color SCSI Video Adapters					
Aura Systems ScuzzyView (13")	65.4	47.9	24.7	210%	438%
Radius PowerView (13")	82.4	61.5	24.1	20%	15%
Aura Systems ScuzzyView (16")	89.1	68.9	22.6	140%	256%
Radius PowerView (16")	125.6	90.1	23.3	20%	15%
Aura Systems ScuzzyView (19")	115.3	99.4	21.9	231%	453%
Color Internal Video Adapters					
Computer Care BookView Imperial (13")	32.1	27.1	13.1	68%	103%
Computer Care BookView Imperial (16")	39.6	34.8	11.6	68%	103%
Computer Care BookView Imperial (19")	48.1	46.1	10.8	68%	102%
	Shorter bars are better.	Shorter bars are better.	Shorter bars are better.	Longer bars are better.	Longer bars are better.

*Tested with built-in LCD display. **At 80 dpi.

Performance for external monitors depends greatly on the connection solution used. The fastest performance is offered by the internal video adapters, which benefit from the high throughput of the RAM circuitry they plug into. In real-world tests, the performance of SCSI-based adapters is slower than that of internal video adapters, since the SCSI circuitry is slower. Size and color also have an effect: it takes longer to display color than black-and-white (the SCSI-based monitors are all monochrome, while all the adapters support color, except for the Lapis PowerBase I, whose results were thus excluded here), and it takes longer to display an image on a large monitor than on a small one. In the QuickDraw tests, results bear little resemblance to real-world tests because

The PowerBook Duos introduced revolutionary docking stations, including E-Machines' PowerLink DeskNet (top), which adds Ethernet connections; E-Machines' PowerLink Presentor (right), which adds extensive video connections; and Apple's MiniDock (left), which offers standard Mac connections.

RasterOps began shipping the ClearVue/SD21 monochrome 21-inch display at press time. We looked at a unit and came away believing that $1799 for a 21-inch black-and-white display is not a worthwhile investment (see *Reviews*, this issue).

SCSI video adapters If you want color display on your notebook and are put off by the $3500 to $5000 price tag of the active matrix color screen replacements offered by Newer Technology (316/685-4904) and Envisio (612/339-1008), you might consider an external SCSI video adapter. These adapters take a video signal from a Mac's SCSI port and translate it into a standard video signal, which is sent to any standard monitor through a standard video port (see "Breaking the PowerBooks' Video Barrier"). These adapters let you use existing monitors—whether at home, at your office, or at someone else's office. Some also support VGA video ports used by DOS PCs, so you don't need to worry if the office you're visiting uses Macs. But like SCSI monitors, these adapters are limited by the inherent sluggishness of SCSI.

We tested the $599 Radius PowerView and the $695 Aura Systems ScuzzyView, both of which support color display, and the $599 Lapis Technologies PowerBase I, which supports only monochrome display. (The $699 PowerBase II, which supports color, was scheduled to ship by the time you read this.) The color adapters were slower than the SCSI monitors—because color takes even longer to display than black and white—and much slower than the one internal video board we evaluated. The monochrome Lapis adapter was acceptably fast, partly because it supports only monochrome and partly because Lapis uses blind SCSI transfer, which is faster than the standard SCSI transfer mode. (The standard SCSI mode is purposely slow, to be backwardly compatible with the Mac Plus's slow SCSI bus. If you use the PowerBase I on a Plus, you can set the adapter to run at the slower speed.)

Coming from a company with such a good reputation for video products, the Radius PowerView was a real disappointment. It was the slowest unit overall in our tests. It supports 8-bit color or gray scale on monitors up to 16 inches, but only monochrome on 19- and 21-inch displays. Radius's technical-support department told us that the company tested PowerView compatibility only with Radius and Apple monitors, and that it would not support the PowerView's use with other products.

The PowerView allocates some of the Mac's system memory—as much as 542K, depending on the screen size—for its internal use, so you won't want to use it on a bare-bones notebook. And the unit was very sensitive to the PowerBook's nonstandard SCSI termination, especially in a daisy-chain of additional SCSI devices. The PowerView caused errors in other SCSI devices when we did not terminate the first device in the SCSI chain (which you should do in a PowerBook). Other SCSI video adapters that weren't terminated did not create this problem. The PowerView could not support Outbound notebooks, although other adapters could.

The Lapis PowerBase I supports monochrome output on 12- to 21-inch displays, with fair performance. The PowerBase handles SCSI termination inelegantly: to remove termination, you have to take off the PowerBase I's cover and remove terminating resistors. The termination should be external or switchable.

The Aura Systems ScuzzyView turned out to be the best video adapter of the bunch. It was faster than the others, its images had the best color fidelity, and compatibility was not a problem, even with VGA displays. (It supports monitors as large as 19 inches at 8-bit color or gray scale.) But it lacks mirroring mode, which detracts from its usefulness in demos.

All the SCSI-based video solutions share a potential problem: they may not work correctly with applications that do not follow Apple's video standards. The Radius PowerView was the most compatible of the SCSI video products tested (see *Lab Notes*, this issue).

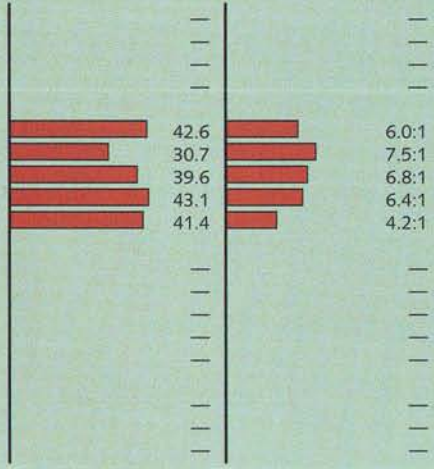
Due to the relatively poor performance of all of these units, you should pass them by in favor of an internal video board. If you decide that the advantages of a SCSI adapter—most notably, cost and the ability to be moved among Macs—warrant purchasing one, choose the ScuzzyView.

Internal video adapters The best option we found for video was the $1399 Computer Care BookView Imperial. This board installs in the PowerBook's RAM-expansion slot and has 6MB of RAM, which brings your PowerBook up to its

SCREEN QUALITY TESTS

Max Brightness (in footlamberts)

We tested each monitor with brightness turned up as high as it could go without showing scan lines. A reading of more than 20 footlamberts is good.



Longer bars are better.

Contrast Ratio (ratio of white to black)

The luminance of the whitest squares compared with that of the blackest throughout the screen. A comparative luminance for white of 6 times or more is good.

Longer bars are better.

QuickDraw processing is a very minor component of overall performance for these adapters. The major components are the speed of the Mac's processor, the speed of the adapter's circuitry, and the complexity (size and color depth) of the image.

NOTEBOOK-COMPATIBILITY GUIDE

Company	Product	List Price	Tested by Macworld Lab	PowerBooks 100, 140, 145, 170	PowerBooks 160, 180	PowerBooks Duo 210 230	Outbounds 2000, 2030 series	Technical-Support Rating	Consumer Contact: Toll	Consumer Contact: Toll-Free
EXTERNAL HARD DRIVES										
APS Technologies	Companion 80	$499	○	●	●	●[1]	●	very good	816/478-8300	800/235-2752
	Companion 120	$599	●	●	●	●[1]	●	very good		
La Cie	PocketDrive 40MB	$348[2]	○	●	●	●[1]	●	excellent	503/520-9000	800/999-0143
	PocketDrive 80MB	$598[2]	○	●	●	●[1]	●	excellent		
	PocketDrive 120MB	$698[2]	●	●	●	●[1]	●	excellent		
Liberty Systems	20 Series 80MB	$998[3]	○	●	●	●[1]	●	○	408/983-1127	○
	20 Series 120MB	$1198[3]	○	●	●	●[1]	●	○		
Mass Microsystems	HitchHiker 40	$599	○	●	●	○[1]	●	○	408/522-1200	800/522-7979
	HitchHiker 80	$899	○	●	●	○[1]	●	○		
	HitchHiker 120	$999	○	●	●	○[1]	●	○		
SCSI MONOCHROME MONITORS										
Generation Systems	PowerPlay	$999	●	●	●	●	●	[4]	612/633-5222	800/325-5811
Mirror Technologies	ViewPort	$749	●	●	●	●	●	satisfactory	612/633-4450	800/654-5294
Outbound Systems	Outrigger	$949	●	●	●	●	●	good	303/786-9200	800/444-4607
RasterOps Corporation	ClearVue/SD21	$1799	○	●	●	●	●	○	408/562-4200	800/729-2656
Sigma Designs	Power Portrait	$749	●	●	●	●	●	good	510/770-0100	800/845-8086
SCSI VIDEO ADAPTERS[5]										
Aura Systems	ScuzzyView	$695	●	●	●	●	●	excellent	619/438-7730	800/365-2872
Lapis Technologies	PowerBase I[6]	$599	●	●	●	●	●	poor	510/748-1600	800/435-2747
	PowerBase II	$699	○	●	●	●	●	○		
Radius	PowerView	$599	●	●	●	●	○	good	408/434-1010	800/227-2795
INTERNAL VIDEO ADAPTERS										
Computer Care	BookView Imperial	$1399	●	●[7]	○	○	○	very good	612/371-0061	800/950-2273
Lifetime Memory Products	Video+	$695[8]	○	●	○	○	○	○	714/969-2421	800/233-6233
Mirror Technologies	PowerVision	$499–$999[9]	○	●	○	○	○	satisfactory	612/633-4450	800/654-5294
INTERNAL FAX MODEMS										
Apex Data	Freedom 14/96	$529	○	●	●	○	○	○	510/803-2020	○
	Freedom 96/96	$599	○	●	●	○	○	○		
Apple Computer	PowerBook Fax Modem	$225	○	●	○	○	○	○	408/996-1010	○
Global Village Communications	PowerPort Bronze	$229	○	○	●	●	○	○	415/329-0700	800/736-4821
	PowerPort Gold	$499	○	●	●	○	○	○		
	PowerPort Silver	$429	○	●	●	○	○	○		
MacProducts USA	Magic AFX 24/96	$179	○	●	●	○	○	○	512/472-8881	800/622-8721
Mass Microsystems	24/96	$249	○	●	●	○	○	○	408/522-1200	800/522-7979
PSI Integration	PowerModem	$195	○	●	●	○	○	○	408/559-8544	800/622-1722
	PowerModem II	$295	○	●	●	○	○	○		
	PowerModem III	$395	○	●	●	○	○	○		
	PowerModem IV	$495	○	●	●	○	○	○		
Twincom	14.4 PowerTwin	$399	○	●	●	○	○	○	919/256-8025	800/723-2962
	24/96 PowerTwin	$189	○	●	●	○	○	○		
WIRELESS MESSAGING										
Apex Data	Cell-Connect Kit	$299[10]	○	●	●	○	○	○	510/803-2020	○
Applied Engineering	Axcell Cellular Interface	$299[10]	○	●	○	○	○	○	214/241-6060	800/554-6227
Motorola Paging Div.	Embarc NewsStream	$395	○	●	●	●	○	○	○	800/362-2724
DOCKING CONNECTORS										
Apple Computer	DuoDock	$1079	○	○	○	●	○	○	408/996-1010	○
	Duo MiniDock	$589	○	○	○	●	○	○		
	SCSI Disk Adapter	$39	○	●[11]	●	●	○	○		
E-Machines	PowerLink DeskNet	$699	○	○	○	●	○	○	503/646-6699	800/344-7274
	PowerLink Presentor	$499	○	○	○	●	○	○		
Outbound Systems	SCSI Kit	$139	○	○	○	○	●	○	303/786-9200	800/444-4607
Pilot Technologies	BookEndz	$129	○	●[7]	●	○	○	○	612/828-6002	800/682-4987
PRINTERS										
Eastman Kodak	Diconix 180si	$459[12]	○	●	●	●	●	○	716/253-0740	800/344-0006
GCC Technologies	WriteMove II	$599	○	●	●	●	●	○	617/275-5800	800/422-7777

● = yes; ○ = no. Technical-support ratings are based on a series of calls made by Macworld staffers posing as customers to each company to gauge the accessibility, helpfulness, and accuracy of their support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual products, and we call only those companies whose products Macworld Lab tests. [1] With Duo's optional docking adapter. [2] Price includes required 30-pin to 25-pin connector adapter. [3] Price includes $199 battery charger. [4] Support offered through dealers only. [5] Limited to eight colors on PowerBook 100 and Outbounds. [6] For black-and-white display only. [7] Not compatible with PowerBook 100. [8] PowerBook 100 version $795. [9] Price depends on amount of RAM included. [10] Connects to modem sold separately by the company. [11] Compatible only with PowerBook 100. [12] Includes required Macintosh interface kit.

8MB maximum. Although the PowerBooks' RAM sockets were not designed to handle video, crafty engineers figured out how to make it possible. The advantage is fast video transfer (unlike the SCSI-based solutions) and an inconspicuous video hookup (no external adapter boxes or cabling needed). Of all types of video options, the BookView Imperial was the fastest in our tests by a wide margin.

Because its video chips are software-programmable, Computer Care will be able to support new monitors with different resolutions simply by updating the control panel. (It now supports 16.)

We evaluated the board with a wide variety of monitors. In all cases, performance was excellent. Screen redraw speeds were virtually indistinguishable from those of a desktop computer, and the color was good, especially in graphics programs such as Adobe Photoshop. Another plus is software support for mirroring, so you can run a presentation on your notebook and have the audience see the same display on the external monitor.

As good as its performance is, there are a few problems with the BookView Imperial. At press time the board was incompatible with virtual memory and the PowerBook's RAM disk. Computer Care promises a software fix for virtual memory, and will provide an alternative RAM-disk program. The video connector you install with the BookView board is a small, flat plug that comes out of one of the PowerBook's hinge covers and sticks to the rear of the PowerBook with double-sided tape—hardly a confidence-inspiring setup. Computer Care said it is working on a modified hinge cover that would enclose the video connector. The actual hookup to the monitor is a flat-ribbon cable that ends in a standard 15-pin Mac female video connector, but the cable mates to the PowerBook's video-out connector with a friction fit, which is easily dislodged. (You need an adapter to connect the BookView to a VGA monitor.) Furthermore, the BookView works better with VGA connectors than with Mac connectors on some monitors (such as those from NEC) and LCD panels (such as those from Proxima and nView). A more serious incompatibility is that the BookView Imperial can cause 120MB Quantum Go drives to behave erratically, because the BookView and Go 120 together draw too much power. The BookView is also not compatible with the popular shareware drive-formatter SCSI Director, nor, when used on an external drive, FWB's formatter.

Still, the BookView is a decent solution for video, providing fast redraw, good color output, and broad compatibility. The board costs $1169 for the PowerBook 100 and $1399 for the other first-generation PowerBooks (including 6MB of RAM).

Another popular internal video board has been the Envisio Notebook Display Adapter (see Reviews, Macworld, September 1992). The Envisio boards range from $795 to $1595, depending on the amount of RAM included on the board. Envisio recently discontinued this product.

After our lab testing deadline, Mirror Technologies began shipping a relabeled Envisio unit under the PowerVision name (see Reviews, this issue). We strongly preferred the Mirror board because of its lower price and broader software compatibility, even though it supports fewer monitor sizes than the BookView Imperial.

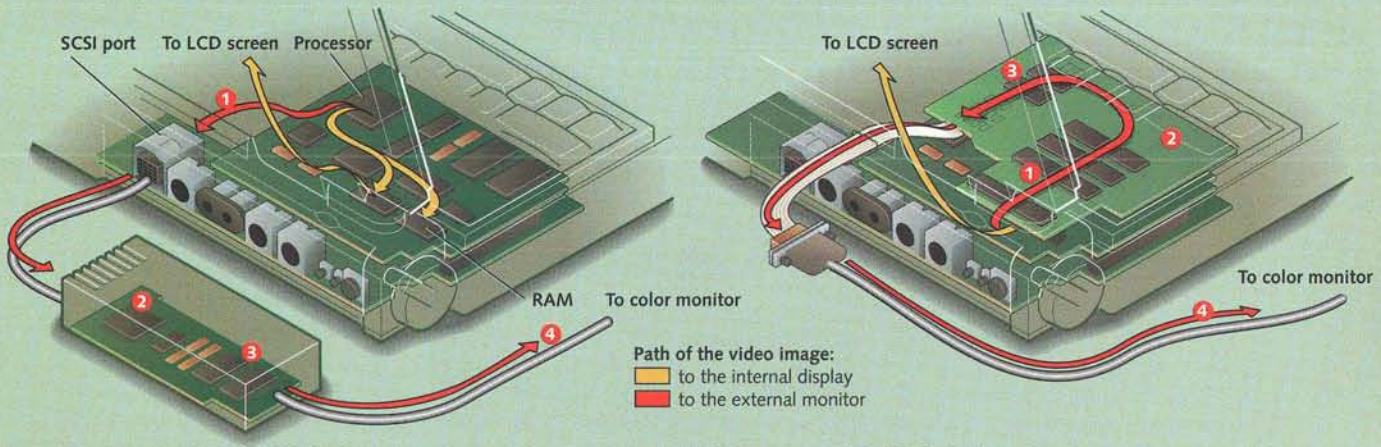
Also coming soon are 16-bit video adapters for the first-generation PowerBooks from both Computer Care (the BookView Imperial 16 for $1549) and Envisio (the ColorBook 16 for $1295 to $1895, depending on how much RAM is included). These adapters are promised to support 16-bit color (32,738 colors) on monitors as large as 16 inches and 8-bit color (256 colors) on 19-inch monitors.

Staying in Touch

HANDY FOR DESKTOP MACS, MODEMS ARE practically essential for notebook use so you can stay in touch with clients or the main office. The market for internal data/fax modems is dominated by two companies: Global Village Communication, which sells the PowerPort series, and PSI Integration, with its PowerModem line. Both companies offer modems in a variety of speeds. They all work in all the

Breaking the PowerBooks' Video Barrier

The PowerBook 100, 140, 145, and 170 lack built-in support for external monitors. To add this support, some vendors add an external SCSI adapter; others add an internal RAM adapter. In both cases, the vendors route the video image intended for external display through a nonvideo part of the PowerBook's hardware. They also use an INIT to tell the PowerBook how to send the video image over these nontraditional video routes.



External SCSI Adapters

Most vendors supply an INIT that intercepts the QuickDraw commands that describe a video image; the INIT then sends a copy of the commands over the SCSI port to the external adapter **(1)**. A processor on the adapter's own logic board translates the QuickDraw commands into the video image **(2)** and stores the resulting screen bitmap in VRAM **(3)** within the adapter. The adapter then sends the image for display on the external monitor **(4)**. Because the Radius PowerView has no processor, it relies on the PowerBook's processor to translate the QuickDraw commands. Because SCSI is inherently slow, SCSI video adapters are slow.

Internal RAM Adapters

Some vendors supply an INIT that intercepts the QuickDraw commands that describe a video image; the INIT then sends a copy of the commands to the adapter board **(1)**, which plugs into the PowerBook's RAM slot. A processor on the adapter's own logic board translates the QuickDraw commands into the video image **(2)** and stores the resulting screen bitmap in VRAM **(3)**. The adapter then sends the image over a special dealer-installed connector for display on the external monitor **(4)**. Vendors whose adapters have no processor follow the same process but rely on the PowerBook's processor to translate the QuickDraw commands.

first-generation PowerBooks, as well as in the 160 and 180. And all are both data modems and send/receive fax modems.

Global Village's PowerPort Bronze is a $229 2400-bps data/9600-bps fax modem; the $429 PowerPort Silver is a 9600-bps data/9600-bps fax modem; and the $499 PowerPort Gold is a blazing 14,400-bps data/9600-bps fax modem. The PowerPorts come with Global Village's excellent fax software, GlobalFax. The PowerPort line is also completely internal to the PowerBook, unlike Global Village's discontinued PowerPort V.32, which required a separate telephone interface.

PSI's PowerModem line consists of the $195 PowerModem, a 2400-bps data/9600-bps fax unit; the $295 PowerModem II, which adds V.42bis data compression and MNP Class 10 error-correction for faster throughput; the $395 PowerModem III, a 9600-bps data/9600-bps fax unit; and the $495 PowerModem IV, which transmits data at 14,400 bps and is the only PowerBook modem available that can transmit and receive at the new 14,400-bps fax speed. At press time, PSI was previewing optical character recognition (OCR) for received faxes, which would let you scan faxes into a word processor. PSI also plans to offer fax broadcast, which is a service that, with a long-distance phone company such as AT&T or MCI, lets you upload one copy of a fax, along with a distribution list, to a central fax server. The phone company's fax server then sends the fax to everyone on the list.

At press time Apple had announced but not shipped the PowerBook Express Modem, a $319 internal modem for the PowerBook 160 and 180. This will be a V.32bis, 14,400-bps data/9600-bps fax unit. A unique feature of this modem will be its reliance on the CPU for some functions, such as data compression. Applied Engineering had also announced but not shipped a modem called the DataLink PB. This 14,400-bps data/fax/voice modem fits into the first-generation PowerBooks and has a $299 optional interface for cellular phones, so you don't need a phone line.

THE SMALL DOCKING STATIONS OFFER BOTH PORTABILITY AND CONNECTIVITY

Many companies sell external modems, with and without fax capability. If you're a notebook owner you should consider them if you need to share one modem among Macs, and if you don't mind carrying a separate unit. Examples of modems that need no AC adapter include the $745 QBlazer modem from Telebit Corporation (408/734-4333), which is tiny (a 2-inch cube), fast (runs at 9600 bps), and requires only a 9-volt battery to operate. Outbound has the $379 PocketPort Fax, an ADB-powered, 2400-bps data/9600-bps fax modem the size of a pack of playing cards.

Which modem to buy depends mainly on whether you plan to use AppleTalk Remote Access to hook up to your computer or your company's network while on the road. AppleTalk Remote Access lets you access an AppleTalk network over the phone lines (see "Remote Possibilities," *Macworld*, January 1993). For remote access, a 9600-bps or 14,400-bps modem is a must, because, with a 2400-bps modem, the most basic remote operations—opening a Finder window, for example—are painfully slow. Another reason to get a high-speed modem is if you will often transfer data with other computers, or with online services or bulletin board systems that support high-speed data transmission. If you don't intend to use the modem much for either AppleTalk Remote Access or large-volume data transfer, but are looking mainly for a fax modem, both the PSI PowerModem and the Global Village PowerPort Bronze are excellent choices.

For those who want to be up-to-date no matter where they are, Motorola has announced the Embarc NewsStream wireless messaging system that connects to a PowerBook. The $395 device gives you access to your E-mail system, as well as to information services such as stock quotes and news for a monthly fee.

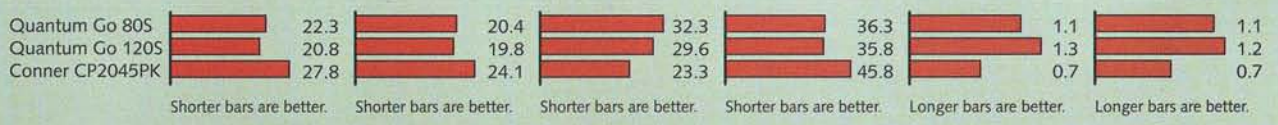
Integrating with Other Macs

EVEN IF A NOTEBOOK MAC IS YOUR PRIMARY computer, you may want to plug into a network or directly into another Mac to quickly exchange large numbers of files. All notebook Macs let you connect to a network via the serial port or modem, but there are other direct-connect methods.

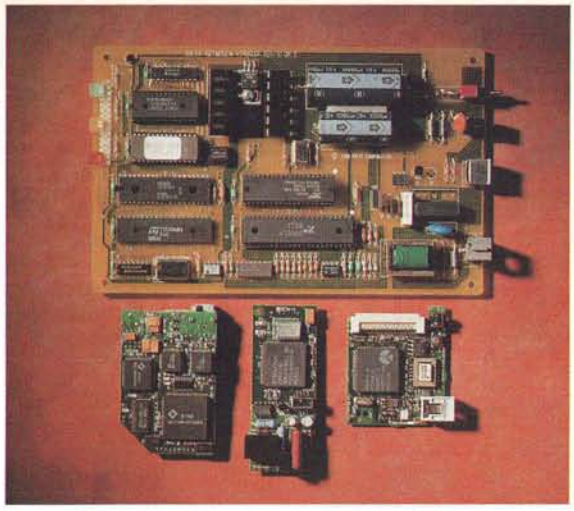
The simplest is to plug the notebook into another Mac's SCSI port, which makes that Mac think the notebook is simply another hard drive. Unfortunately, in the first crop of Mac notebooks only the PowerBook 100 and Outbound offered this capability (through optional adapters). But the new PowerBook 160 and 180 and the Duo 210 and 230 support this feature (again, through an optional adapter).

Another handy integration technique is a docking station—a box into which you plug desktop peripherals on one side and a notebook on the other. Voilà, instant desktop Mac, with everything preconfigured and no bewildering array of cables to deal with. Unfortunately, the original Mac notebooks weren't designed with this in

MW LAB Portable Drive Performance



All vendors use the Quantum Go mechanisms for both internal and external notebook drives, since the Go drives are currently the only 2.5-inch 80MB and 120MB drives available in large quantities. The formatting software that comes with a drive can affect performance by about 10 percent. Results here are averages both for several units of each mechanism and for several tests. For example, the duplicate test includes a 3.2MB file and a 10MB folder. For comparison, we also show the results for the 40MB Conner drive that Apple installs in its PowerBooks.



Ever-smaller computers require ever-smaller modems. Compare the modem board from the external Shiva Netmodem/E (top) to those used in the Outbound Pocket Port Fax Modem external fax modem (lower left), Apple PowerBook 170 internal modem (center), and PowerBook Duo internal modem (right).

mind, and the only solution (for the PowerBook 140, 145, and 170) is the $129 BookEndz docking station made by Pilot Technologies (see *The Desktop Critic*, *Macworld*, September 1992). A version for the PowerBook 160 and 180 has also been announced. The BookEndz squarely addresses a need for first-generation PowerBook owners.

Apple has taken the docking station concept several steps further in its Duo line (see "Apple's Dynamic Duo," *Macworld*, December 1992). The Duo Dock offers expansion options (up to two NuBus boards) but takes a lot of space and costs a fair amount ($1079). For small spaces and portability, better options are the $589 Duo MiniDock from Apple (but made by SuperMac Technology) and the two PowerLinks from E-Machines. All provide the standard set of Mac ports; the MiniDock also has a pass-through connector for a Duo's internal modem.

E-Machines' $499 PowerLink Presentor is designed for people who need to take presentations on the road. It supports 8-bit color on popular 14- and 16-inch displays and 4-bit color (16 colors) on popular 19-inch monitors. The unit works with LCD overhead projection panels and produces SuperVGA, NTSC (the U.S. television standard), and PAL output (the TV standard in many nations). A feature called *convolution* reduces the flicker normally seen when sending Macintosh video to a television set. QuickDraw acceleration is built in, as is hardware panning and zooming to 200 percent. In addition to its video functions, the PowerLink Presentor provides a stereo audio jack, an ADB connector, two serial ports, and an HDI-30 SCSI port for an external floppy drive.

The $699 PowerLink DeskNet, designed as an alternative to Apple's MiniDock, has the same RGB-video-output capability as the PowerLink Presentor and adds a thin (10Base2) or twisted-pair (10BaseT) Ethernet port to the package. You also have stereo audio in and out, ADB, external floppy drive, serial, and SCSI ports. The PowerLink DeskNet is a better choice than the Apple Duo MiniDock; for only about $100 more, the DeskNet has what the MiniDock does (except for the modem pass-through connector), plus Ethernet.

Envisio (612/339-1008) has announced the Dynamic Duo, a small docking station due in January, with 16-bit-video and stereo-sound capabilities. No price had been set at press time.

Hard Copy on the Road

IF YOU NEED TO PRINT WHILE YOU'RE traveling, you have several options. The first works if you're visiting a site that has a Mac-compatible printer. You should carry a serial cable or an AppleTalk-compatible network connector along with your PowerBook, so you can hook into the office's network and print. If there aren't any printers in sight, but you have a fax modem in your notebook, plug into a phone line and fax your pages to the office's fax machine. While the result is just 200-dpi output, it's better than no output at all.

We also looked at two portable printers, the $599 GCC Technologies WriteMove II and the $459 Eastman Kodak Diconix 180si, both of which can be battery-operated. The new WriteMove II is tiny, lightweight, easy to use, and offers high resolution (360 dpi). The Diconix is heavier and has coarser resolution (192 dpi). Both print at about a half page per minute and require that each sheet be hand-fed. And both come with Adobe Type Manager and a selection of fonts.

The 2½ pound WriteMove II is a winner. The printer uses thermal-ribbon technology to produce crisp, dark blacks with its single-strike ribbon. The drawback of this ribbon is that it is only good for about 20 pages, then you must replace it. For longer ribbon life, but lesser quality, use the multistrike ribbon, which prints up to 100 pages before it is exhausted.

The Diconix 180si ink-jet printer is larger and heavier than the WriteMove II. Its print quality is inferior to that of the WriteMove II's single-strike ribbon and roughly equivalent to that of the multistrike ribbon.

MW EDITORS' CHOICE

External Hard Drives

PocketDrive 120MB Lightweight, portable, well-designed, these external drives are a great option for anyone seeking to expand a notebook's storage. **Company:** La Cie. **List price:** $699.

Companion 120 This battery-powered drive is especially well suited for travelers. **Company:** APS Technologies. **List price:** $599.

SCSI Monochrome Monitors

Power Portrait Its light gray phosphors, multiple resolution settings, virtual desktop, and reasonable refresh rates make this SCSI monitor the best choice for people seeking a portable portrait display. **Company:** Sigma Designs. **List price:** $749.

Internal Fax Modems

PowerPort series, PowerModem series Both series offer speeds from 2400-bps data/9600-bps fax to 14,400-bps data/9600-bps fax (the PowerModem IV supports 14,400-bps fax). And both series have excellent fax software. **Company:** Global Village Communications (PowerPort series); PSI (PowerModem series). **List price:** PowerPorts $229 to $499; PowerModems $195 to $495.

Docking Connectors

PowerLink DeskNet For a PowerBook Duo owner seeking desktop connectivity, this is the best option, offering all the standard Mac ports plus broad video-output capabilities and an Ethernet connection. **Company:** E-Machines. **List price:** $699.

Should you get one of these printers? Not unless you must always have a printer on the road. If so, get the WriteMove II. Otherwise, get an inexpensive StyleWriter for your home office if you're short on cash, or an inexpensive laser printer if you have a bit more money (see "Personal Printers," *Macworld*, September 1992).

Customize Your Office

THE CORNUCOPIA OF PORTABLE PERIPHerals gives you wide latitude in building a portable office. Whether you need large amounts of storage, fast communications, flexible display options—or all three—you can tune your system so that the tools you need most while on the road are at your fingertips. And you can easily reconfigure or grow your portable office by upgrading or replacing components as needed. The portable Mac office is now a reality—take advantage of it. **m**

TOM NEGRINO is a *Macworld* contributing editor.

Macworld Lab testing by MARK HURLOW.

hello mr. modem...

CD ROMs and online services bring a wealth of stock images to your Mac

by Ronnie Shushan

DIGITAL STOCK PHOTOS

Need a soothing image of a sunset? A still from *Casablanca?* A news photo from the 1992 presidential election? If so, chances are you can find it using your Macintosh to search through a growing number of CD ROM and electronic-bulletin-board photography collections.

Stock photo agencies—which sell publication rights to the thousands of pictures in their catalogs—have been supplying prints and transparencies to graphic designers and picture editors for decades. In 1993, digital photo libraries based on those stock agency collections are poised to take off. Major stock photo agencies such as AllStock, FPG International, and The Stock Market have recently released CD ROM catalogs; and new dial-up services from Eastman Kodak and Picture Network International, a consortium of stock photo agencies, are expected to be available later in 1993.

But the emergence of digital photo collections poses many questions. How do the cost and procedure of using a photo from a CD ROM or bulletin board compare with the traditional methods of dealing with a stock photo house? What kinds of images are available? What rights do you get—and not get—with a digital photo? What software do you need for maneuvering through image libraries? And perhaps most important, how do you determine if the image quality offered by a particular CD ROM or online service meets your needs?

How It Works

TYPICALLY, WHEN YOU BUY A STOCK photo, you phone in a research request to an agency that represents large numbers of photographers. The agency researcher then sends you, by messenger or overnight mail, a variety of prints and transparencies that fit your photo request. You pay a research fee—typically $50 to $75—and negotiate a usage rate for the images ultimately selected for publication.

The usage rate is determined by the size of the photo as it appears in your publication, as well as by the nature and distribution of the publication (nonprofit newsletter, national magazine, and so on).

GLENN MITSUI

A DIGITAL PHOTO GALLERY

TRAVEL/LANDMARKS
FPG International
FPG International's disc —part of Mirror's CD-Stock bundle—offers images of far-flung lands. Other CD ROM sources for travel shots include Gazelle Technologies and PhotoDisc.

PEOPLE
PhotoDisc
PhotoDisc Vol II: People & Lifestyles features a range of pictures, from children in the rain to seniors on the beach, that can strike an emotional chord among a publication's readers.

During the selection process, you're liable for a $1500 fee if you lose or damage any piece of original art that the agency sends you for consideration.

Digital photo catalogs are helping to streamline the process of using stock photos. You can browse through image thumbnails in a CD ROM or bulletin board, much as you would flip through a printed catalog. But with these digital picture libraries, you can also zero in on the types of images you want through an electronic search—grouping all the thumbnails of horizontal landscapes or couples on a beach, for example. Having the images in digital form makes it easy to see how they'll look in your electronic layout, and the process greatly reduces the amount of original art that's sent through the mail.

Who's It For?

DIGITAL PHOTO COLLECTIONS ARE TARgeted at two types of buyers. For the growing communications market—the businesses and nonprofit organizations that desktop computers have turned into publishers—digital-image collections provide a source of previously unaffordable photos.

These digital photos can cost as little as 50 cents each, but like clip art, they don't generally measure up to the quality of stock photo originals, which cost from $50 to thousands of dollars per image. That's because, in many cases, what you're getting from a CD ROM is a scanned image with only 72-dots-per-inch resolution, which can't compare in quality to an original, continuous-tone photograph or transparency. But for many publishers on a budget, low-resolution photos selected from a digital image collection can add life and color to a publication, at the right price.

For the higher-level media market—the designers and publishers of books, magazines, newspapers, advertisements, and slick corporate promotions—access to digital image catalogs is likely to change the way in which photo buyers preview and select images from stock agencies.

With some CD ROMs and online bulletin boards, you choose the image you want from among the low-resolution scans, then contact the stock agency to obtain a high-resolution scan of that image or, most likely, an original print or transparency for reproduction purposes.

Images on CD ROM

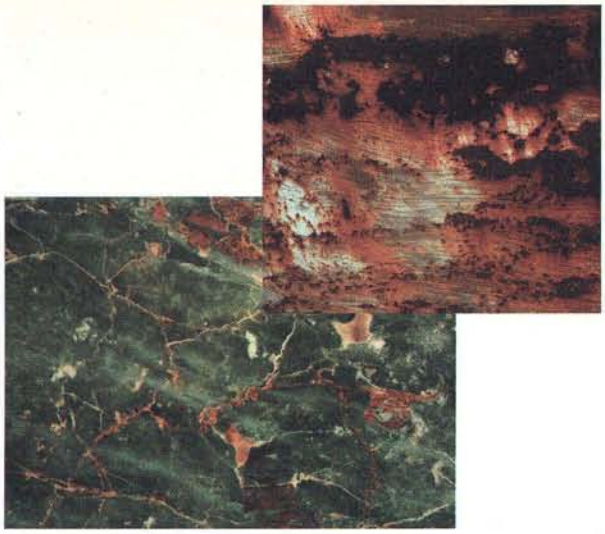
CD ROMS, WITH THEIR CAPACITY TO store large amounts of data (just over 600MB), are becoming a popular way to distribute digital photo catalogs. It's important to remember, however, that a stock photo house's primary business is selling photo rights, not CD ROMs. As a result, many CD ROM photo products serve as a guide to the images available through a stock agency, rather than as an actual photo database.

For example, the images offered on three new high-profile CD ROM products—the CD-Stock series, The Westlight Sampler 1, and The Image Bank Catalog 12 (due for release in January)—are all 24-bit color files with resolutions of 72 dpi. The low resolution means these images are best used for screen display or for the presentation layouts that designers call comps, but not for most reproduction purposes (see "Digital Photo Sources" for a sampling of the stock photo CD ROMs and online services available). You can easily select an image you need and test it in an electronic layout, but you must request original art from the photo agency for reproduction-quality photos and negotiate a usage fee.

CD ROM photo catalogs offer a variety of images, packages and prices, file formats, and usage rights.

The CD-Stock set of four discs is a cooperative venture between 3M, Mirror Technologies, and four of the top stock photo houses—AllStock, FPG International, The Stock Market, and Tony Stone Worldwide. Priced to appeal to the many designers who don't yet own CD ROM drives, the $995 introductory package includes Mirror's CD ROM drive, 3M's CD-Stock image-management software, and four discs with a total of 20,000 photos.

The discs provide a wide variety of images, typical of the diverse collections of those agencies. Nonetheless, each of the four collections shows only a fraction of the agency's photos; some agencies have up to 600,000 images in their collections, while others offer several million photos.



BACKGROUNDS/ TEXTURES
D'Pix
D'Pix Folio 1 Print Pro's backgrounds and textures add an inexpensive but striking design element to a page.

NEWS
Reuters/KRT
By dialing up PressLink, you can download the latest news photos, from Madonna's décolletage (Reuters) to Bill Clinton's victory speech (KRT).

Comstock, one of the largest commercial stock photo agencies and the first to release a photo CD ROM, last fall released the first of five volumes in Comstock's Encyclopedia of Desktop Photography. Unlike the CD-Stock, Westlight, and Image Bank CD ROMs, the Comstock discs include the right to use the 72-dpi images for noncommercial, in-house use, such as a company newsletter or a teaching aid, as well as for comps.

WestStock provides the images for PhotoDisc's series of five CD ROMs. Although the images can't be used in a product for sale (whether editorial, such as a book or magazine, or commercial, such as a greeting card or T-shirt), they can be placed in advertisements, presentations, business, and broadcasts.

Discs with less-restricted use tend to have fewer images and a tightly focused selection. For example, Gazelle Technologies' Swimsuit CD offers nothing but pictures of women in bathing attire. But before you snicker, consider the nonprofit publisher who uses this $199 CD ROM as an inexpensive source for head shots to illustrate women's health stories.

Bulletin Boards

BLAZING THE TRAIL FOR ONLINE SERvices is PressLink (a Knight-Ridder subsidiary), a dial-up network of electronic bulletin boards that offers text, graphics, and photos from more than two dozen news organizations and a few photo agencies.

Image Quality

With the exception of CD ROM photo catalogs—whose images are intended for layout position only rather than for reproduction—almost every CD ROM collection of digital photos is promoted as having high-resolution scans. But if you compare file sizes, you'll realize that's not the case.

A truly high-resolution digital photo, one that you'd find in *Sports Illustrated,* for example, can be anywhere from 12MB (for a 4-by-5-inch image) to 70MB (for a two-page-spread photo). The CD ROM photo collections currently on the market have files ranging in size from 500K to 22MB.

To determine if the vendor's definition of high resolution is sufficient for your purposes, you need to know the resolution of the scans on the CD ROM and the line screen to be used in printing your publication.

Image resolution, the amount of information in a digital file, is measured in dots per inch. Screen frequency, the density of the lines of dots used to print a continuous-tone photograph, is measured in lines per inch. Newspapers typically use a coarse line screen of 85 lpi; in-house publications, 100 to 120 lpi; and glossy magazines, 133 to 155 lpi.

In general, optimal image resolution is twice the line screen: optimal dpi = 2 × lpi. But size is an important factor, too. When you reduce an image, you increase the effective resolution; when you enlarge the image, you decrease the resolution. So if you're resizing the original scan for use in your publication, the formula to use is dpi = 2 × lpi × percent of original size.

Consider a CD ROM image that's 300 dpi and 5 by 7 inches. You plan to print it at 65 percent of the original size, using a line screen of 133 lpi. In this case, the optimal resolution is 173 dpi (2 × 133 × 0.65), and the 300-dpi original provides more resolution than you need to successfully print the image.

If the CD ROM image is only 72 dpi, however, you don't have enough information in the file for good reproduction (remember that the optimal resolution is 173 dpi). The printed image is likely to lose detail, with some jagged edges where there should be smooth curves, or to appear posterized, with rough gradations in tone and unacceptable levels of contrast. (For more information on halftones see "Halftones Demystified," in this issue.)

HISTORY

The Bettman Archives

Bettman has a wealth of historical photos, including Churchill during World War II and San Francisco after the 1906 earthquake.

PEOPLE

Gazelle Technologies

The Swimsuit CD specializes in beautiful women. Gazelle offers other specialty people discs, including People at Leisure and People in Business.

PressLink's primary market is small-to-medium-circulation newspapers, which use the service to access photos from a Mac or PC rather than installing a satellite dish. You don't have to be a newspaper to subscribe, however. And while PressLink charges monthly, online, and data-transmittal costs, most news and stock photo agencies that offer images through PressLink offer the choice of a monthly fee with unlimited use or a fee-per-download pricing structure. This second option makes the service affordable to organizations with less-demanding photo needs than newspapers have.

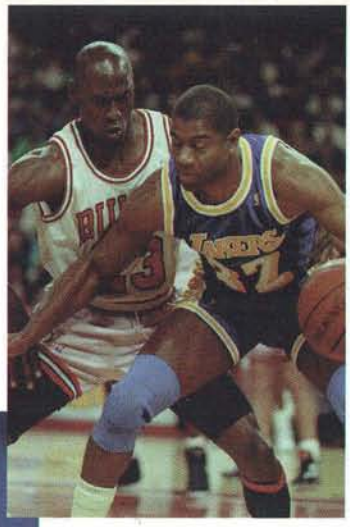
As of this writing, PressLink offers roughly 30,000 photos online, which are accessed through an easy-to-use, menu-driven interface. Among its suppliers are such news agencies as Reuters, Knight-Ridder, and Agence France-Presse; All-Sport, a stock agency specializing in sports photography; The Bettmann Archives, the agency many turn to for historical and background pictures; and even the United States Army, which offers, at no cost for editorial use, pictures of generals, new weapons, and assorted military activities.

PressLink's scans are JPEG-compressed and optimized for a newspaper halftone screen of 85 lines per inch. But their large image size (12 by 18 inches is not uncommon) enables anyone who publishes pictures at smaller sizes to increase the resolution for finer line screens (see "Image Quality").

DIGITAL PHOTO SOURCES

Source	Product	Price
CD ROM		
Comstock	Desktop Photography Vol. 1	$199.00
	Desktop Photography Vol. 2	$89.00
	Desktop Photography Vol. 3	$199.00
	Encyclopedia of Desktop Photography Vol. 1	$399.00
D'Pix	Folio 1 Print Pro	$499.95
Gazelle Technologies	Swimsuit CD Vol. 1	$199.00
	African Wildlife	$129.95
	U.S. Travel	$129.95
	World Travel: Europe	$129.95
	World Travel: Far East & Asia	$129.95
Mirror Technologies	CD-Stock	$995.00[2]
PhotoDisc	PhotoDisc Vol. I: Business & Industry	$395.00
	PhotoDisc Vol. II: People & Lifestyles	$395.00
	PhotoDisc Vol. III: Backgrounds & Textures	$295.00
	PhotoDisc Vol. IV: Science, Technology, & Medicine	$395.00
	PhotoDisc Vol. V: World Commerce & Travel	$395.00
Cantrall's Photos on Disc	Nature & Scenic Backgrounds	$249.00
	Flowers and Trees	$249.00
	Wild & Domestic Animals	$249.00
	Coastal Themes	$249.00
Scott & Daughters	Stock Workbook: CD-ROM	$39.95
Westlight	The Westlight Sampler I	$15.95
ONLINE SERVICES		
Comstock	On-Line Access	Setup fee $99; download fee $4.50–$9 per image[4]
PressLink, Inc.	PressLink	Setup fee $50; download fee 5.4 cents per kilobyte[4]

[1] For position only. [2] Price includes a CD ROM drive from Mirror, CD-Stock software from 3M, and four discs. The reproduction, request original art or high-res scan and negotiate the reproduction fee as usual.

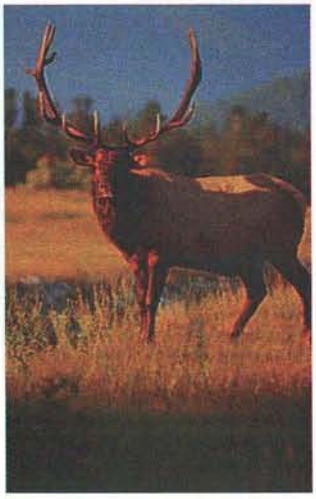


SPORTS/ATHLETICS
AllSport
Images of athletes, such as these from the All-Sport PressLink bulletin board, are often used for business publications to convey competitiveness.

BUSINESS/INDUSTRY
FPG International/ PhotoDisc
Traffic jams are a popular way to illustrate stagnation—bottlenecks and logjams—in business situations (FPG), while an airplane in flight suggests upward motion (PhotoDisc).

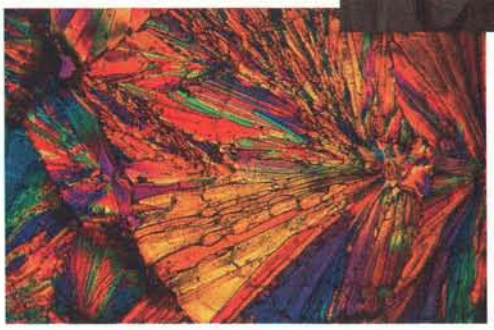
Number of Images	Image Formats/dots per inch	Rights	Toll-Free Phone	Other Phone
499	8-bit gray-scale TIFF/72	comps; FPO[1] layouts; noncommercial	800/225-2727	212/353-8600
100	24-bit color, 8-bit gray-scale TIFF/72	comps; FPO[1] layouts; noncommercial		
441	24-bit color, 8-bit gray-scale TIFF/72	comps; FPO[1] noncommercial		
3000	24-bit color, 8-bit gray-scale TIFF/72	comps; noncommercial		
100	24-bit color TIFF/266, 75	unlimited	800/238-3749	614/299-7192
200	24-bit color TIFF, 8-bit color PICT/72	unlimited	800/843-9497	619/536-9999
200	24-bit color TIFF/110; 8-bit color PICT/72	editorial; advertising for print runs of less than 10,000		
200	24-bit color TIFF, 8-bit color PICT/72	editorial; advertising for print runs of less than 10,000		
240	24-bit color TIFF, 8-bit color PICT/72	editorial; advertising for print runs of less than 10,000		
240	24-bit color TIFF, 8-bit color PICT/72	editorial; advertising for print runs of less than 10,000		
20,000[3]	24-bit color TIFF/72	comps	800/654-5294	612/633-4450
408	24-bit color TIFF/300, 72	advertising, business; presentations	800/528-3472	206/441-9355
409	24-bit color TIFF/300, 266, 72	advertising; business; presentations		
111	24-bit color TIFF/266, 72	advertising; business; presentations		
250	24-bit color TIFF/300, 266, 72	advertising; business; presentations		
300	24-bit color TIFF/300, 72	advertising; business; presentations		
100	24-bit color TIFF/300	one-time regional print runs of 100,000 and under	800/843-9497	916/933-5554
100	24-bit color TIFFs/300	one-time regional print runs of 100,000 and under		
100	24-bit color TIFF/300	one-time regional print runs of 100,000 and under		
100	24-bit color TIFF/300	one-time regional print runs of 100,000 and under		
2000	24-bit color TIFF/72	viewing only	800/547-2688	213/856-0008
3000	24-bit color PhotoCD format/72	search and retrieval only	800/872-7872	310/820-7077
12,000	24-bit color TIFF/72	noncommercial[5]	800/225-2727	212/353-8600
30,000	varies by vendor	varies by vendor	NA	305/376-3818

four discs without the CD ROM drive cost $650. [3] *Each of the four discs in this package contains 5000 images.* [4] *Other charges apply as well.* [5] *For commercial*



NATURE/ANIMALS
AllStock
The animal kingdom is a popular subject for stock photography. Among discs with digital nature images are AllStock and Cantrall's Photos on Disc series.

SCIENCE/MEDICINE
PhotoDisc
An image of surgeons at work can be used to convey precision and skill, while this microscopic enlargement of a sugar crystal could work as an abstract trexture.



PressLink Access, the software used to view the images, assembles all the thumbnails in a given folder into the equivalent of an on-screen contact sheet. When you decide which images you want to use, you download the full-resolution files of those images using PressLink 2000, a communications and file-transfer utility; downloading takes 4 to 12 minutes at 9600 bps.

You can print a 72-dpi CD ROM stock photo (top), but scanning a transparency at high resolution (254 dpi, below) provides a better image. CD ROM image and transparency are from FPG International.

Meanwhile, Comstock is now offering some 12,000 images online, in addition to its CD ROM series. The images—24-bit TIFFs at 72 dpi—are intended for layouts, presentations, and noncommercial in-house use. For commercial reproduction, you must request the original transparency (or a high-res scan, which the agency sends on a SyQuest cartridge) and negotiate the reproduction fee as usual.

Most of Comstock's compressed images are 40K to 60K and take 4 to 7 minutes to download at 9600 bps. The images have been compressed using Kodak's ColorSqueeze utility; when you double-click on a file icon, the image decompresses to around 550K. You can save the file in TIFF or PICT format.

Image Management

WITH THE PROLIFERATION OF DIGITAL photo collections, image management becomes a critical issue. You need to be able to view thumbnails, create your own minicatalogs, conduct sophisticated keyword searches that quickly locate suitable images, and index images according to your own criteria.

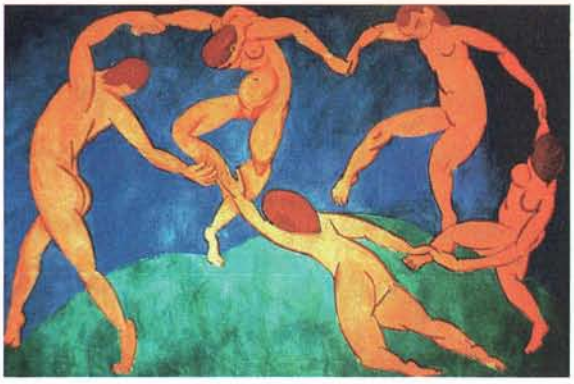
LightBox, the software used by 21st Century Media for its PhotoDisc CD-ROM series, is a full-featured application, enabling you to view thumbnails (and to customize the thumbnail layout), search for images by keywords (and use Boolean descriptors such as AND, OR, and BUT NOT), edit the keyword list for any image, and paste images from one PhotoDisc catalog into another.

You can mark thumbnails, view and print only the marked files, and save the marked files to your hard drive as a minicatalog—a useful feature when you need to review preliminary photo selections with colleagues. You can also sort images by photographer, file name, catalog ID number, and so on.

At press time, several image-management products had been announced but were not available for review, among them were Aldus's Fetch, Nikon's ImageAccess, Kodak's Shoebox, and 3M's CD-Stock. All of these products were scheduled to ship before the end of 1992.

The ultimate success of CD ROM catalogs as a design tool may well depend on how easily designers can create their own custom catalogs of images from a variety of vendors. Aldus hopes its Fetch application, with the ability to catalog files in almost all standard Mac formats, will become the standard image-management program, creating a need for other image-management programs to be compatible with Fetch. But whether you'll be able to move images and the information attached to them (photo credits, keyword lists, and so on) from one management program to another remains to be seen.

In general, the less-expensive discs with fewer restrictions on usage (such as those produced by Gazelle Technologies) provide a HyperCard browser for viewing



ARTS
The Bettman Archives
The Bettman Archives is filled with classic movie stills (*Gone with the Wind,* top left, *The Lady from Shanghai,* left) and fine arts reproductions (Matisse's *La Danse*).

thumbnails. The search function is limited to one or two descriptive words, the indexing provided by the publishers is rarely adequate, and you can't edit the keyword list. You can mark the files, but you can't save the markings when you close the file, even if you save the file to a hard drive. You can get by with this sort of casual browsing if you use an occasional photo from one or two discs, but it's totally inadequate for managing large numbers of images in a production environment.

Legal Issues

USAGE RIGHTS FOR DIGITAL PHOTOS vary tremendously, so it's important to read all licensing agreements closely.

For example, PhotoDisc advertises "unlimited use for print, presentations, brochures, newsletters, and ads," but the actual license agreement adds "as long as the images are not used to create a product for sale." So if your newsletter goes free to an alumni group, that's OK, but if you sell a newsletter by subscription, it's not.

Some vendors allow "noncommercial" use, but the definition of noncommercial can be confusing. Comstock considers photos that illustrate an in-house training manual to be a noncommercial use, but photos used by a consultant hired to do an in-house training manual for a corporation are considered commercial use. The difference is that in the latter scenario, the consultant is using the photos to sell a service, thereby constituting commercial use.

Not understanding the copyright regulations that protect an image can get you into trouble, too. For instance, many consumers think it's okay to use an image if they alter it sufficiently. That's not the case, though—if any image, or part of an image, is recognizable as being derived from another image, you need permission from the copyright holder. In addition, some licensing agreements specifically prohibit image manipulation.

It's best to play it safe. If the usage you need falls outside the restrictions in the licensing agreement, you must negotiate a usage fee with the vendor, just as you would if you were buying a traditional stock photo. And if you're uncertain about what is or is not protected by copyright, don't assume—ask.

The Future of Digital Photos

WHILE THERE'S BEEN A GREAT DEAL OF progress in the digital photo market recently, the best is yet to come.

CD ROM photo collections should continue to gain in popularity, as CD ROM drives become more prevalent, thanks to the anticipated acceptance of Kodak's Photo CD format. But accessing images with a modem is, in many ways, going to be more promising than owning a collection of discs.

Kodak has announced Picture Exchange, a network on which a keyword search will enable you to preview low-resolution images from a variety of agencies. Picture Exchange—currently set to debut by mid-1993—will forward the user's selection to the respective agency, which will then negotiate usage fees and provide prints, transparencies, or in some cases, high-resolution scans.

Another group, Picture Network International (PNI), plans to make available both preview and reproduction-quality images on its photo network, set to go online in late 1993. AllStock, Black Star, Contact Press Images, Stock Boston, and Woodfin Camp are expected to contribute photos to the 250,000-image database.

License arrangements for print use will be handled by the individual agencies, while rights for electronic media use will be negotiated directly by PNI on a uniform rate basis, thus simplifying the procurement of rights by multimedia publishers who need large numbers of images.

By the mid-1990s, fiber-optic phone lines—capable of transmitting huge amounts of data quickly—are expected to be much more widely available, giving users the ability to connect to enormous image databases.

With all this activity, the problem with digital photo libraries may soon be one of too many choices. As problems go, though, that's a nice one to have. m

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DATA GUARDIANS

How strong are the software locks on 24 security products?

BY BRUCE SCHNEIER

Security problems have become almost as commonplace as desktop computers. A disgruntled city employee, trying to get back at the boss, digs into the mayor's personal files and sends damaging information to the press. A woman asks her computer-expert husband to recover an accidentally deleted budget file; he recovers not only that file, but purposely deleted letters to an illicit lover. Or a major corporation loses critical financial data to an industrial spy who dialed in to a company file server.

Most of us have some computer-security vulnerability. Fortunately, software solutions can address mild concern through outright paranoia. Some security products will keep your kid brother from reading your files. Others will prevent a Mac guru from reading your files. Still others will bar the best Macintosh programmers in the industry from reading your files. Finally, some software will probably keep the spy agencies of large nations or the industrial spies of multinational corporations from reading your files.

DIANE FENSTER

Range of Protection

THE DIFFERENCES AMONG SECURITY PROgrams are defined by both the type of security offered and the strength of implementation. The simplest security measure is password protection. If you're just worried about family members, coworkers, or nighttime office guards, password products are just fine. Password protection builds software locks around your system software, hard drive, folders, or files. If you have the password, you can get in easily; if you don't, you have to try to break the locks. And like physical locks, security programs vary in strength and reliability.

If you're worried about experienced hackers breaking into your system, use a program that encrypts files and folders on the hard drive. Encryption products alter files so that they become meaningless gibberish. If you have the password, the program decrypts the files; if you don't, you're out of luck unless the security product offers central administrator controls that allow emergency access (see "Access-Protection Programs" and "Encryption Plus Access-Protection Programs").

Some password-protection programs can be bypassed with standard hard drive utilities; others require more-advanced programming skills. Some programs use quick and easy encryption algorithms; they keep out all but skilled mathematicians and computer scientists. Others use the Department of Commerce–approved data encryption standard (DES) which, implemented properly, should keep out the cloak-and-dagger types at the National Security Agency (NSA).

I was able to break all but the strongest encryption programs

Security software is based on the concept of a *key*—usually a series of keyboard characters used by programs to decide whether to grant access to a computer, folder, or file. Without the correct key, you're locked out. Unfortunately, in most cases anyone sufficiently determined and skilled can find the key.

I tried to break 24 security programs by examining their code for weaknesses. I tried getting around their security measures by using disk utilities, file editors (such as ResEdit), and a debugging tool (such as MacsBug). In extreme cases I disassembled the code. I was able to break all but the strongest encryption programs—usually with ease (see "Breaking the Code").

By the way, I have no intention of providing a cookbook for any of my cracking methods or making my programs public. They are not available on any bulletin board; I won't send you a copy. I hope software vendors whose programs I cracked will take it as a challenge to write better security software.

Access Control

ALMOST ALL SECURITY PROGRAMS CONtrol access to a hard drive. Many, such as Magna's Empower series, usrEZ Software's ultraSecure, Casady & Greene's A.M.E., ASD Software's FileGuard, and Kent Marsh's NightWatch II can partition a hard drive and grant individual passwords to several users. That feature is also part of some hard drive utility packages, including Symantec's Norton Utilities for Macintosh, Casa Blanca Works' Drive7, La Cie's Silverlining, FWB's Hard Disk ToolKit, and AlSoft's Power Utilities.

Kent Marsh's NightWatch II, ultraSecure, and A.M.E. offer the option of a key disk. This is a special floppy disk that a user must insert (in addition to typing a password) to access the hard drive. ASD Software's FileGuard has a similar option: it works with ASD's $349 MacaccessCard magnetic card reader.

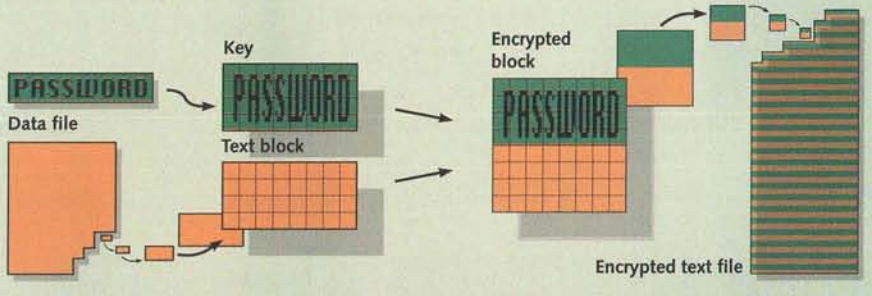
Many security programs have an optional screen-locking feature that protects the computer even after it has been turned on. The screen lock can be set to engage after you move the mouse to a particular location, when you hit a hot key, or after a specified period of inactivity. Someone walking up to a machine with a locked screen can't use it without the password. All such programs except CPU, from Connectix, and FileGuard support background tasks, such as printing and network access, while the screen is locked.

Another critical feature is the audit log, as kept by Kensington Microware's PassProof, FileGuard, Datawatch's Citadel with Shredder, NightWatch II, FolderBolt (also from Kent Marsh), Empower, Praxitel's Passport, ultraSecure, Fifth Generation Systems' DiskLock, and A.M.E. This log records all attempts to access the sys-

How Files Are Encrypted

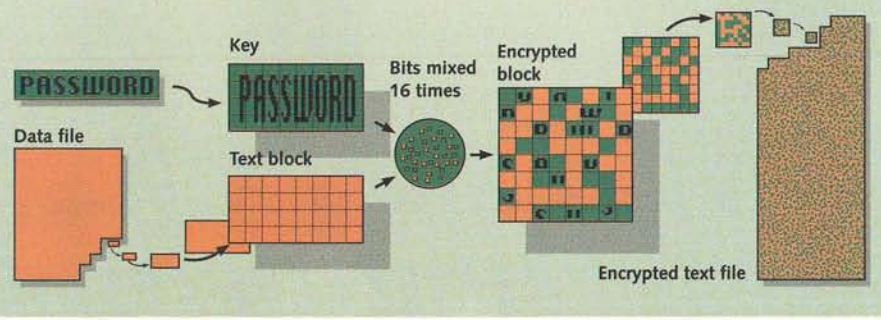
PROPRIETARY ENCRYPTION

Proprietary encryption programs generate a key by using the binary bits of a password typed by the user. The key is then added to a text block—a small part of the data file—to create an encrypted block; when combined, those blocks become an encrypted text file. The relatively simple mathematical encryption formula offers less security than DES encryption does.



DES ENCRYPTION

DES encryption generates a key in the manner of proprietary programs. But with DES, the bits within the key and text blocks are then mixed and shuffled 16 times, using a complex algorithm. Encrypted blocks are then recombined to create an encrypted file that for nearly all practical purposes cannot be broken.



Network Security

If security on a stand-alone Macintosh has you tossing and turning at night, think of security on networked Macs as a nightmare. AppleTalk was designed for ease of use, not security.

People who use file sharing without thinking leave their files easily vulnerable. You have to be selective about what files you open and to whom.

The Mac system doesn't inform users when someone else is accessing their files, but users can find out by using Nok Nok, a $49.95 program by Trik (800/766-0356). Nok Nok notifies users when someone initiates a remote connection, keeps a log of the activity, and can disconnect outside users after a specified period.

AppleShare 3.0 supports some password security, but there are many ways to get around it. Anonymous (guest) log-ons, automatic log-ons, and alias files can all be used to gain unauthorized access to a file server.

Guest log-ons allow people without passwords to access parts of a file server; the process works fine only if the system administrator carefully restricts such privileges to selected files or folders. Similarly, in a system that uses automatic log-ons and alias files without a secure access configuration, anyone can automatically log on to the server. Or if someone leaves a Mac unattended after logging on (without a screen-locking security program), anyone can access the server.

Another problem involves network traffic interceptions. AppleTalk does not encrypt data passing across the network. Packet sniffers—hardware and software packages that read data as it travels across the network—can view all traffic, no matter whom messages are addressed to. No existing product encrypts data as it travels across the network (be it AppleTalk, Ethernet, FDDI, or any other).

Routers are a way to improve security by segmenting sections of the network. Unfortunately, many of them can be reconfigured over the network. They are password protected, but often not very well. A snoop can reconfigure a router to collect all kinds of interesting information for a packet sniffer on the other end. Even worse, someone can buy a new router and stick it on the network. A network administrator at the University of Illinois says that every so often new routers appear on the network. He watches for the problem, but people who don't are vulnerable.

A network may not be safe from off-site intruders. Most AppleTalk networks are wide open to remote users. Some routers offer zone- or resource-hiding features; selected printers, file servers, or even entire parts of the network can be hidden from remote users.

tem, successful or not. The feature can determine if someone is trying to break into your system, or help you discover who is using the system.

Tracking Users

ALL OF THE PROGRAMS THAT OFFER AN audit log, except Citadel with Shredder, and FileGuard, protect that log with a password to prevent an intruder from modifying it. NightWatch and PassProof go so far as to encrypt the audit log. DiskLock automatically alerts legitimate users of unauthorized attempts to access the system. All of the programs that support the log, except ultraSecure and Passport, let you print the audit log; all except Citadel with Shredder, and Passport let you export the audit log to a word processing program.

Even after you type in your password, some programs keep on working. FileGuard, Empower II, ultraSecure, and A.M.E. allow customized access. Some users may be able to read and copy data files, but not delete or modify them. Others may read, modify, or copy files, but may not delete applications. This can be a boon in schools whose labs are used by different classes throughout the day.

Empower II also allows custom limits on the use of applications, Apple menu items, and control-panel items. Empower II and ultraSecure optionally allow guest users, who can log on to the machine and use unprotected programs and data.

EDUARDO CITRINBLUM

Guards at the California Youth Authority in Norwalk, California, use ultraSecure to keep inmate data confidential.

Empower Remote (which has all the features of Empower II) enables you to manage all of this remotely over a network. One security administrator can manage an entire network of Empower-protected Macs from one workstation. ultraSecure has everything from a simple screen locker to a complex, multilevel security program. The system administrator can configure the security at the desired level.

FileGuard and ultraSecure can modify applications so only password-holders can launch them. If you fear software pirating, FileGuard can also modify applications that are removed from the hard drive with a "suicide pill," which disables the removed application either immediately or after a specified period of use.

Empower, ultraSecure, and Citadel with Shredder can disable the floppy drive after start-up; this can prevent both unauthorized copying of software and the introduction of computer viruses. ultraSecure works with System 7 aliases; it can even allow access to an alias while denying access to the underlying program. This prevents unauthorized deletion or pirating. You can hide applications in a protected folder, and aliases still work transparently—even across the network.

Kent Marsh products take a modular approach to security. Each individual product provides a portion of the comprehensive security you get with a single package from some other vendors. NightWatch protects access to a hard drive, FolderBolt protects the desktop, and Kent Marsh's MacSafe II encrypts files. You only have to

buy the security you need, but if you need all the features, everything works together and works well. Kent Marsh sells the three products together as its Executive Security Kit, for $269.

It's also worth considering the relative convenience of password procedures. FileGuard, Empower, and ultraSecure work in the background—just enter your password once when you log on and that's it. DiskLock separates the access control and the encryption functions, requiring a password at log-on and again to encrypt or decrypt. A.M.E.'s convoluted interface requires the password at various points.

The Encryption Edge

IF YOU'RE WORRIED ABOUT SOPHISTICATED hackers or major intelligence agencies, try encryption. But it can be slow—up to an hour for a 1MB file, depending on the speed of your Mac and the product used. Because encryption changes a file's bits, an error in encryption or decryption could effectively destroy a file. And if you lose the key, you're out of luck. Symantec recently received a call from a police department, which lost its encryption key for the Norton Utilities DES module and couldn't recover the data. There was nothing Symantec could do to help. Always back up data—including encrypted data and keys.

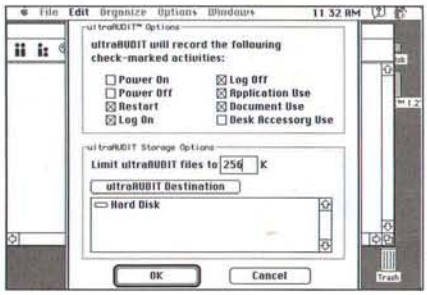
The security of any encryption program depends on the strength of its encryption algorithm. Cryptographers spend years coming up with algorithms, only to have them broken by colleagues. Algorithms that seem foolproof can have hidden mathematical tricks that reveal fatal flaws. Governments have buildings full of people with more degrees than a thermometer working to develop encryption algorithms. Don't expect the same effort from a software vendor.

Too many encryption programs leave the key under the mat

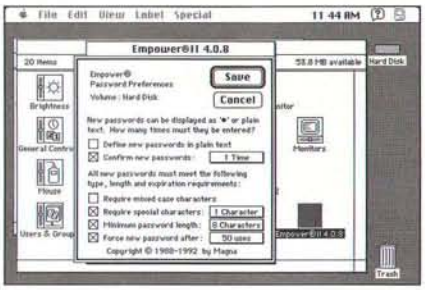
When a security program claims to have a proprietary encryption algorithm, you should immediately be suspicious. Proprietary algorithms are generally designed to be fast and easy to implement, not secure. Nearly all such algorithms—including those offered by DiskLock, Norton Utilities, A.M.E., MacSafe II, and Empower (which also offer DES options); those in Hard Disk ToolKit and FileGuard (which do not offer DES options); as well as the built-in algorithms in WordPerfect, Microsoft Excel, and Informix's Wingz—are mathematically similar to one the Union Army broke during the American Civil War. It was secure then, but today a cryptographer with a computer can break it in five minutes. MacSafe II's alternate proprietary algorithm, LightningCrypt, varies significantly from that archaic approach—and it's only slightly more secure. The proprietary-algorithm options in usrEZ's ultraSecure and Camouflage are better, but not as strong as DES.

While programs with proprietary encryption algorithms may discourage unsophisticated but nosy coworkers, I don't recommend using such products. Password-protection programs will keep out all but experienced Macintosh programmers. Anyone skilled enough to break the best password-protection scheme will also be able to break a proprietary-encryption algorithm.

Two companies already sell products that break passwords for Excel, Wingz, and WordPerfect. AccessData (800/658-5199) offers Wrpass for WordPerfect, and Xlpass for Excel, $185 each; NewVision (405/523-1639) has MasterKey ($165) for Excel, WordPerfect, and Wingz.



Audit Log ultraSecure allows you to keep an audit log of specific user activities. This lets you keep track of which users log onto the computer, and what applications and documents they use.



Password Help Empower can be configured to prevent users from choosing simple passwords. Here, passwords must be at least eight characters long and must include at least one nonalphanumeric character.

ACCESS-PROTECTION PROGRAMS

General	BulletProof 1.0	CPU 1.0	DiskMaker 1.6.5	Drive 7 2.3	FolderBolt 1.02e
Company	Spectra Micro Development	Connectix Corporation	Golden Triangle Computers	Casa Blanca Works	Kent Marsh
Telephone	602/795-7288	415/571-5100; 800/950-5880	619/279-2100; 800/326-1858	415/461-2227	713/522-5635; 800-325-3587
Price	$99	$99	$89	$79.95	$129.95
Online help	○	●	●	●	●
Features cracked	all	all	all	all	all
DRIVE ACCESS CONTROL	○	●	●	●	○
Prevents access (to hard drives/hard drive partitions)	NA/NA	●/○	●/●	●/●	NA/NA
Uses an optional key disk	NA	○	○	○	NA
Includes physical locks for floppy drive and serial port	NA	○	○	○	NA
Allows multiple passwords/master password	NA	●/○	●[1]/●	●[1]/○	NA
Provides screen locking	NA	●	○	○	NA
Allows background tasks with screen locked	NA	○	NA	NA	NA
FILE ACCESS CONTROL	●	○	○	○	●
Protects files and/or folders from copying/from deleting	●/●	NA/NA	NA/NA	NA/NA	●/●
Protects files and/or folders from modifying/from reading	○/○	NA/NA	NA/NA	NA/NA	●/●
Protects applications from copying/from deleting	●/●	NA/NA	NA/NA	NA/NA	●/●
Protects applications from modifying/from reading	○/○	NA/NA	NA/NA	NA/NA	●/○

● = yes; ○ = no; NA = not applicable. [1] Allows one password per partition.

Breaking the Code

Every password-protection program for the Macintosh can be broken. The easier ones, like Passport and CPU, can be bypassed simply by booting from a floppy disk. (If the program says it prevents this, hold down option-shift-control-delete when booting—that has always worked in the programs I've tried it on.) Some programs, like Trend Micro Devices' SafeLock, lock the hard drive and make files invisible. Almost any hard drive utility can undo this. FolderBolt and NightWatch II move files to a location that only the security program can detect—effectively tricking the Finder into thinking the file doesn't exist. But Norton Utilities can diagnose and circumvent that scheme. ultraSecure and Empower also use similar—though more elaborate—ways to trick the Finder, but an experienced programmer with a sector editor, such as those provided by Norton Utilities for Macintosh, MicroCom's 911, and MacTools by Central Point, can reset the correct file tree.

Most security products, such as FileGuard, DiskLock, Empower, A.M.E., ultraSecure, and NightWatch II, modify the SCSI driver so that it won't work without the correct password. Updating the SCSI driver bypasses that.

A.M.E. also alters the Macintosh directory and encrypts the entire drive. To break that I had to use MacsBug to trick the SCSI driver into producing readable data without the key, then I examined the logon file to recover the passwords. The program uses some programming tricks to prevent the use of MacsBug, but a good hacker can neutralize them.

Probero's KeyLock Mac and PassProof include hardware locks that prevent access to the floppy drive and serial port. These made it impossible at the outset to use any debugging tools or cracking programs; there was no way to load them. After I analyzed each program, I used the locked Mac's ROM-level debugger to bypass the program's security and do manually whatever I would have done with a sector editor. While I could read and modify all of the protected files, I still couldn't make copies. To enable that, a locksmith friend came over and picked the locks—it took him a minute each.

Except for ultraSecure, all encryption products that automatically generate keys are pushovers; the key is usually poorly hidden in the encrypted file. That's why for top security you should try ultraSecure or any of the products with manual-key encryption.

More-reliable encryption programs use the DES algorithm—developed, in part, by NSA—which has withstood attacks by some of the world's best cryptographers for more than ten years.

While all DES programs are secure enough for everything but the most-demanding security needs, there is a catch. For the most dependable results, DES should be used in its most secure mode. Only Citadel with Shredder, and MacSafe II offer that mode; the other DES products—Empower, Norton Utilities for Macintosh, ultraSecure, and Camouflage—use another DES mode that is easier to implement.

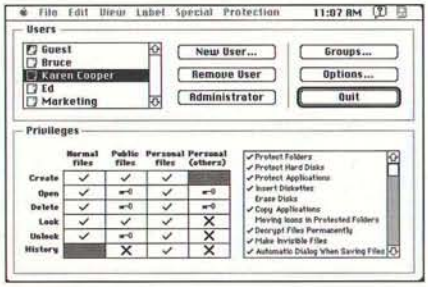
Homemade DES variants offer less security than DES. DES is a very fragile algorithm; minute changes can significantly reduce its reliability. In addition to DES, Citadel offers 1/2-DES and 1/4-DES—faster, but less-secure adaptations of DES. ultraSecure and Camouflage, both from usrEZ Software, offer a double-DES option, where a file is encrypted twice with two different keys. This has been mathematically proven to be no more secure than any of the standard DES modes, but encryption takes twice as long.

While the faster variants are secure from everyone except the most sophisticated adversaries, I don't recommend using any of them. Any encryption takes time, so you might as well get the security for your investment.

Key Management

IF USING DES WERE ENOUGH, THERE would be a multitude of good security packages available. However, I can read files that have been DES-encrypted with Empower (Auto Key option only) and DiskLock. (I could do likewise with A.M.E. version 2.1, though version 3.00 shipped too late to test in this way.) I don't break DES; I look for the key. Consider the lock on your front door. It can be unpickable and unbreakable, but anyone can open it if

Folder Locker 1.2.8	Keylock Mac 3.92	NightWatch II 2.01b	Passport 2.2	PassProof 1.02	QuickLock 2.1	SafeLock 1.0	Silverlining 5.4.1
Software Brewing	Probero	Kent Marsh	Praxitel	Kensington Microware	Kent Marsh	Trend Micro Devices	La Cie
415/940-1946	303/667-4444; 800/366-2515	713/522-5635; 800/325-3587	510/846-9380	415/572-2700; 800/535-4242	713/522-5635; 800/325-3587	310/782-8190; 800/228-5651	503/520-0845; 800/999-0143
$30	$109	$159.95	$24.95	$64.95	$59.95	$49	$99
●	○	●	○	○	●	○	●
all	all	all	all	all	all	all	all
○	●	●	●	●	●	●	●
NA/NA	●/●	●/●	●/○	●/○	○/○	●/●	●/●
NA	○	●	○	○	○	○	○
NA	●	○	○	●	○	○	○
NA	○/○	●/●	○/○	●/●	○/○	○/○	●[1]/●
NA	●	●	○	●	●	●	○
NA	●	●	NA	●	●	●	NA
●	○	○	○	○	○	○	○
●/●	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
●/●	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
●/●	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA
●/●	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA	NA/NA



Access Levels FileGuard allows you to customize privilege levels, such as accessing personal files, and opening and deleting public files only with a password. In the above case, the user can also insert a floppy disk and copy applications onto that disk. But she cannot erase disks.

you leave the key under the mat.

Too many Macintosh encryption programs leave the key under the mat. They try to hide it, but often not well enough. DiskLock uses DES just fine, but then it includes the key with the file. To break into the program, all I have to do is examine the encrypted file for the key. Empower has an option that generates keys for you. I disassembled the program and figured out how it generates the key. Now I can generate the key myself and break into any file automatically encrypted with Empower.

ultraSecure, with the fastest DES in the business, is also the only program with automatic DES encryption whose key-management scheme I couldn't break. usrEZ managed to hide its DES key extremely well. I'm paranoid enough to think that it can be broken by someone, though.

The manually operated key-management schemes are the most secure. Some programs force you to enter your key every time you want to encrypt and decrypt a file. This is more work than using a program that handles it all for you automatically, but manual encryption is more secure because the key is never stored in the computer. The manual encryption modes of Camouflage, Norton Utilities, Citadel with Shredder, MacSafe II, and Empower, are, as far as I can tell, secure. All those products

ENCRYPTION PLUS ACCESS-PROTECTION PROGRAMS

General	A.M.E. 2.1	Citadel with Shredder 1.10	DIskLock 2.12	Empower I 4.08[1]	FileGuard 2.70	Hard Disk ToolKit 1.10	Norton Utilities for Macintosh 2.00
Company	Casady & Greene	DataWatch	Fifth Generation Systems	Magna	ASD Software	FWB	Symantec
Telephone	408/484-9228	919/490-1277	504/291-7221; 800/873-4384	408/282-0900	714/624-2594	415/474-8055	408/252-3570; 800/441-7234; in CA 800/626-8847
Price	$279	$99	$189	$169	$249	$199.95	$149
Online help	●	●	●	○	○	●	●
Features cracked	all[2]	all but encryption	all	all but encryption	all but encryption	all	all but encryption
DRIVE ACCESS CONTROL	●	●	●	●	●	●	●
Prevents access (to hard drives/hard drive partitions	●/○	●/●	●/●	●/●	●/●	●/●	●/●
Uses an optional key disk	●	○	○	○	○[3]	○	○
Includes physical locks for floppy drive and serial port	○	○	○	○	○	○	○
Allows multiple passwords/ master password	●/●	●/●	●/●	●/●	●/●	●[4]/○	●[4]/○
Provides screen locking	●	●	●	●	●	○	○
Allows background tasks with screen locked	●	●	●	●	○	NA	NA
FILE ACCESS CONTROL	●	○	●	○	●	●	○
Protects files and/or folders from copying/from deleting	●/●	NA/NA	○/●	NA/NA	○/●	NA/NA	NA/NA
Protects files and/or folders from modifying/from reading	●/●	NA/NA	●/●	NA/NA	●/●	NA/NA	NA/NA
Protects applications from copying/from deleting	●/●	NA/NA	○/●	NA/NA	●/●	NA/NA	NA/NA
Protects applications from modifying/from reading	●/●	NA/NA	●/●	NA/NA	○/●	NA/NA	NA/NA
ENCRYPTION	●	●	●	●	●	●	●
Encrypts all files/selected files in a folder	●/●	●/○	●/●	●/●	○/●	○/○	●/●
Autoencrypt on save and autodecrypt on open	●	○	●	○	●	○	○
Auto-reencrypt on closing or shutdown	●	○	●	○	●	○	○
Overwrites original after encryption	●	●	●	○	●	○	●
Self-decrypting files	○	○	○	○	○	○	○
Encrypts applications	●	●	●	●	○	○	●
Secure DES encryption	○	●	○	●	○	○	●
FILE ERASURE	●	●	○	○	○	●	●
Overwrites files/drives/ free space	●/●/●	●/●/●	NA/NA/NA	NA/NA/NA	NA/NA/NA	○/●/○	●/●/●
Overwrites three times	●	●	NA	NA	NA	○	●

● = yes; ○ = no; NA = not applicable [1] Empower II ($296) adds complete file-access control and autoencryption. Empower Remote ($396) adds those features plus remote-access abilities.

[2] Version 2.0 was cracked; version 2.1 arrived too late for testing. [3] Company offers magnetic card reader at extra cost. [4] Allows one password per partition.

implement DES according to one of the federally approved modes. Although all ancillary features—such as screen, folder, and disk locks—can readily be broken, any encrypted files are safe from prying eyes.

File Erasure

WHEN YOU DELETE A FILE, THE MAC deletes only the file name from the directory; many Mac utilities can recover the deleted file. To erase a file so this software cannot read it, you have to overwrite all the bits on the disk that contained that file. The Department of Defense (DOD) recommends overwriting a deleted file three times. File-reconstruction experiments conducted by the National Institute of Standards and Technology with electron-tunneling microscopes suggest that even three times might not be enough.

Most of the programs that advertise file erasure follow the DOD's triple-overwrite guidelines. Look for a program—such as ultraSecure, Citadel with Shredder, and Norton Utilities for Macintosh—that overwrites files, entire disks, and that can overwrite all of the free space on a disk. Two specialized products, Viper ($49.95) from Systematic Computer Services (513/275-9476) and Trash Guard ($79), from ASD (714/624-2594), also offer triple-overwrite erasure.

Power Utilities	ultraSecure 1.36	Camouflage 1.50	MacSafe II 2.00
AISoft	usrEZ Software	UsrEZ Software	Kent Marsh
713/353-4090	714/573-2548	714/573-2548	713/522-5635; 800/325-3587
$129	$239	$169.95	$189.95
●	●	●	●
all	all but encryption	all but encryption	all but encryption
●	●	○	○
●/●	●/●	NA/NA	NA/NA
○	●	NA	NA
○	○	NA	NA
●[1]/○	●/●	NA	NA
○	●	NA	NA
NA	●	NA	NA
○	●	○	●
NA/NA	●/●	NA/NA	●/●
NA/NA	●/●	NA/NA	●/●
NA/NA	●/●	NA/NA	●/●
NA/NA	●/●	NA/NA	●/●
●	●	●	●
○/○	●/○	●/○	●/●
○	●	○	○
○	●	●	○
○	●	●	●
○	○	●	○
○	●	●	●
○	●	●	●
○	●	●	○
NA/NA/NA	●/●/●	●/○/○	NA/NA/NA
NA	●	●	NA

The Best Data Guardians

IF YOU'RE INTERESTED ONLY IN PASSword protection, there are a number of good programs you should consider. Both PassProof and NightWatch II provide multiuser hard drive and screen locking, and keep an audit log of log-on attempts. PassProof also comes with hardware locks and is half the price, making it a much better value.

ultraSecure and Citadel with Shredder take top honors. ultraSecure does almost everything I can think of, offers an easy-to-use interface, never crashed on me, was the only automatic-encryption program I couldn't break—and it was also the fastest DES product. At a reasonable $149.95, Citadel with Shredder is also a standout program, but for different reasons. It does not have file-access controls, but does have easy-to-use manual-key encryption—the most secure option available—and the best file-erasure features on the market. DiskLock, FileGuard, and Empower II are also strong programs, but lack ultraSecure's file-erasure mode and offer fewer options for file, folder, and drive protection. If you want to secure a number of machines on a network, though, Empower Remote is hard to beat.

To secure your files against the most sophisticated intruder, choose a key yourself and use a manual-encryption product, copy the file to a clean disk, and burn the old disk with the unencrypted file on it. Or lock the data in a safe; that's the way they do things in the government. ■

BRUCE SCHNEIER, an independent computer-security consultant in Oak Park, Illinois, has worked in security for both public and private concerns. His book, *Cryptography in C*, will be published by John Wiley & Sons in the summer of 1993.

MW EDITORS' CHOICE

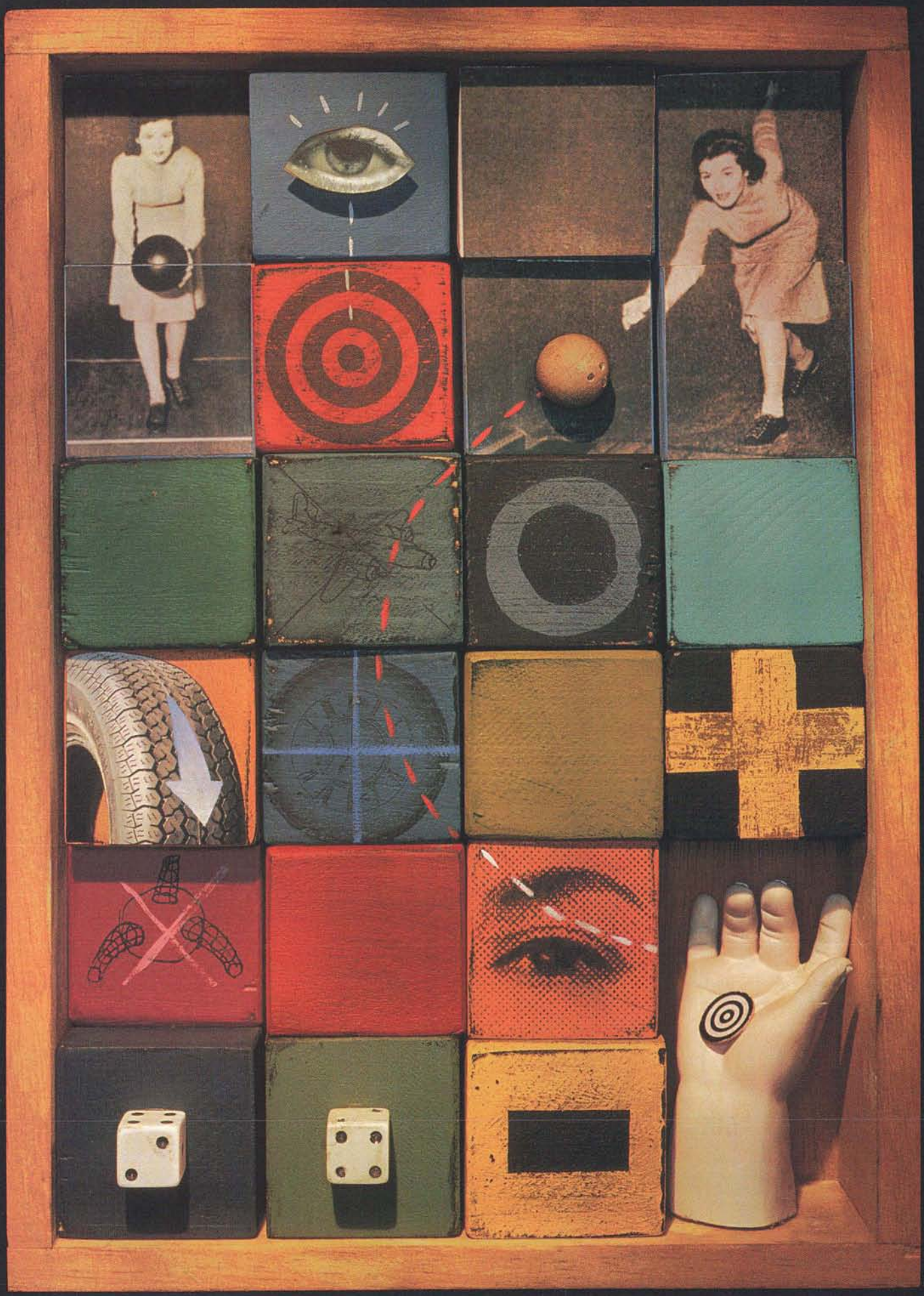
Economy Program

PassProof This program gives you a lot for your money—multiuser password protection, a screen locker, and an audit log of users. It also comes with locks for the floppy drive and serial port. **Company:** Kensington Microware. **List price:** $64.95.

Full-Featured Programs

ultraSecure This fast program smoothly integrates access control, file encryption, audit trail, file erasure, and screen locking into a single package. **Company:** usrEZ Software. **List price:** $239.

Citadel with Shredder This is the cheapest way to get secure encryption and file erasure. **Company:** Datawatch Corporation. **List price:** $149.95.



by Charles Seiter

24-bit Color Graphics

Macworld Lab tests 18 graphics boards that deliver photo-realistic color—and sometimes more

You almost want to touch the image on your screen, thanks to the incredible realism provided by 24-bit-color video-display boards. A must for color publishers and artists, 24-bit video-display boards also appeal to the larger set of users who simply want the best display they can get.

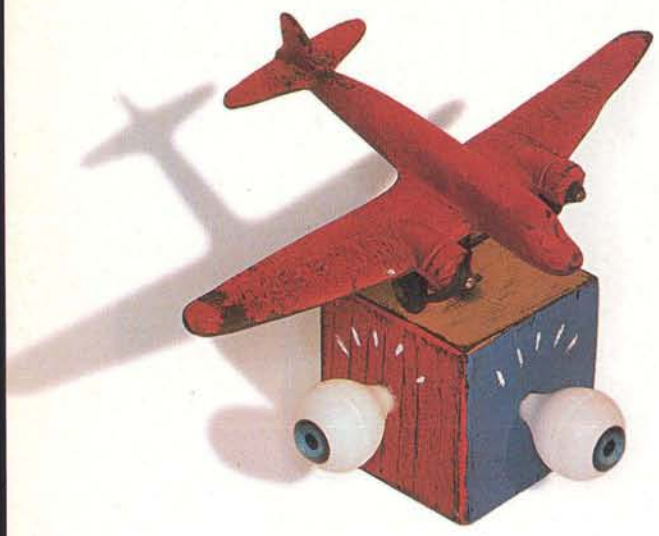
Most 24-bit video-display boards are accelerated through special on-board chips that speed up common video-display tasks, but not all 24-bit video-display boards come with acceleration. So when do you want video acceleration? If you're using 24-bit color a lot, particularly with a large monitor, in programs like Adobe Photoshop and QuarkXPress, you definitely need all the hardware help you can get. If you're using a 14-inch monitor and don't do much high-end color publishing, you may not need the acceleration at all—or at least not the most expensive type of video acceleration. In this case, features like hardware pan and zoom and an extended desktop become important.

If your main consideration is scroll speed and drawing response when working with 24-bit color images in a paint program, you can find an accelerated video-display board for about $1000 (or much less, at street prices). For most basic graphics uses, this gives you more speed for the money than a CPU accelerator; most CPU accelerators that will double your speed on scrolling cost more than an accelerated video-display board. All you have to check is that the board supports the resolution you need for your monitor size (see "Comparing 24-Bit Video-Display Boards").

That's what Macworld Lab concluded when it evaluated 24-bit video-display boards designed to work with an array of standard Mac monitors—from vendors like Apple, E-Machines, NEC Technologies, Radius, Sony, and SuperMac Technology, as well as from many companies better known for their DOS VGA monitors. (For an evaluation of large color monitors, see "The Bigger Picture," *Macworld*, September 1992.)

Why doesn't the Mac's built-in video processing work fast enough for 24-bit images in the first place? The Mac's hard-

GARY TANHAUSER



ware was designed back when a small monochrome monitor was the only display option, and the hardware was fast enough for such displays. The data for a full-screen image on those early Plus and Classic monitors took just 640 by 400 bits, for a grand total of 32K of data per screen. In 24-bit color at the 1152 by 870 resolution that's appropriate for a 19-inch monitor, a full-screen image takes about 3000K. That's about 100 times more data for the Mac to process, and the latest Macs aren't 100 times faster than the early Macs, so you'll see a marked slowdown in screen display for large full-color images.

Quick on the Draw . . .

BECAUSE MOST PEOPLE USING 24-bit color work with large images on large monitors in high-end programs, most 24-bit video-display boards are accelerated. The most common method is QuickDraw acceleration, which generally makes common applications run three to ten times as fast.

The principle is simple: QuickDraw commands normally handled by the Mac's logic board are intercepted by the video-display board. A special-purpose hardware decoder executes the commands faster than the Mac's CPU can. QuickDraw commands, which take only a few bytes each, are the Mac's native language for describing display operations (like filling a rectangle with color); these commands must be translated to the pattern of bits that makes up the image on screen. (These patterns can take hundreds or thousands of bytes.) The video-display board uses accelerated hardware and removes the translation burden from the Mac's CPU to bring about the speedup.

Today's accelerated video-display boards have come a long way from the first QuickDraw accelerators, which only processed QuickDraw commands, and which required a separate video-display board. This hindered speedup because the image data had to move from the QuickDraw accelerator to the video-display board over the Mac's comparatively slow NuBus.

. . . But Slow on the Uptake

SPECIAL HARDWARE CAN EXECUTE a QuickDraw command 100 times faster than can the Mac's CPU. But you won't see that kind of speedup in everyday use. Why not? Because several factors slow things down along the way.

First, the really big speed improvements are mostly on operations on large areas of an image, rather than on lines or small elements. Video processing involves two steps: image setup and image generation. Acceleration affects only image generation, so display of a graphic that requires a lot of setup cannot be sped up very much compared with a graphic that requires little setup. For example, to display a color fill in a rectangle, the CPU makes a modest investment in setting up the rectangle's coordinates; the QuickDraw-acceleration chip on the video-display board does 98 percent of the work of filling in the rectangle's color. Thus, you'll see significant speedup here. But in drawing a large set of small lines, the CPU takes much more time to set up than to generate the video data for the lines, so almost no acceleration results. A lot of what people do involves working with small elements like lines and text, not with large image areas.

Second, some applications, including Photoshop, Macromedia's Swivel 3D Professional, and Autodesk's AutoCAD, bypass many common QuickDraw commands, using either uncommon QuickDraw commands or the application's own special commands instead. This means that the amount of acceleration you get from a particular board depends on the application you use: if

MULTIFUNCTION BOARD OPTIONS

Company	Product	Price	Product Based On	Ethernet	Photoshop Acceleration	JPEG Compression	Video Frame Capture	Video Frame Output	Stereo Audio
E-Machines	ColorLink SX/T, SX/2	$789	Futura SX	●	○	○	○	○	○
RasterOps Corporation	24MxTV	$2199	24Mx	○	●[1,2]	●[1,2]	●	○	○
	24STV	$1258	24Sx	○	●[1,2]	●[1,2]	●	○	○
	24XLTV	$3499	24XLI	○	●[1,2]	●[1,2]	●	○	○
	MediaTime	$1999	24Sx	○	●[1,2]	●[1,2]	●	○	●
SuperMac Technology	DigitalFilm	$5999	Thunder/24	○	○	●	●	●	●
	Spigot & Sound Pro[1]	$1699	Spectrum/8•24 PDQ	○	○	○	●	○	●
	VideoSpigot Pro	$1499	Spectrum/8•24 PDQ	○	○	○	●	○	○

● = yes; ○ = no. [1] Requires two slots. [2] Optional; $1999 for JPEG, $999 for Photoshop.

the application uses common QuickDraw commands a lot, you'll see more acceleration than if it uses less-common QuickDraw commands or its own commands.

Finally, video accelerator designers implement only a few QuickDraw commands in their acceleration chips (called *ASICs*, or application-specific integrated circuits), so the acceleration process slows down every time the application makes a QuickDraw call that isn't executed in the video-display board's ASICs. There are hundreds of QuickDraw commands, but only a dozen or so are used routinely by popular applications. Rather than writing algorithms to speed each QuickDraw command (which is time-consuming and expensive), video accelerator designers have analyzed popular applications to see which QuickDraw commands they use routinely and then have focused on getting the most acceleration possible for these commands. This approach keeps costs down while providing good overall video acceleration. But it also means that the speedup you see will be different from what someone else sees. "Gauging Video Speed" shows these differences between real-world and theoretical acceleration.

In testing video-display boards' speeds, Macworld Lab used a variety of QuickDraw commands to see exactly what commands each board accelerates. The lab results show extreme speed enhancements for some QuickDraw com-

Consumer Contact: Toll	Consumer Contact: Toll-Free
503/646-6699	800/344-7274
408/562-4200	800/729-2656
408/245-2202	800/334-3005

8, 16, or 24?

Although 24 bits, for 16.7 million colors, is considered a standard for "true color" or photo-realistic color, it's a standard that's overkill for visual and printing reality. Ask yourself these questions. Can you perceive 2 million different shades of yellow between orange and green in a continuous rainbow spectrum? Do you work with a printer that can give you 16.7 million colors? Do you think the folks at Pantone give you 16.7 million choices for spot color?

If you answered no to any of these questions, you might be able to live with 16-bit color, for about 65,000 colors on screen, as a lower-cost alternative to 24-bit color. What's the real difference between 16.7 million and 65,000? Look at the accompanying comparison of images and decide for yourself. While 24-bit color is strikingly superior to 8-bit for displaying photographs, its superiority is difficult to discern over 16-bit color in a direct comparison.

Sixteen-bit color appears to be the wave of future video. Already, Apple offers 16-bit color as a low-cost option in the new Macintosh IIvx and Performa 600 models, and the Quadras and new PowerBooks support it in most resolutions. Video-display–board makers are also realizing this. For example, Radius lets you upgrade its PrecisionColor 8X from 8-bit to 16-bit operation, while Lapis Technologies' ProColorServer series can run at 16 bits on monitors as large as 21 inches; NuBus, IIsi, and LC versions are available. For LC owners, the PSI Multicolor board from PSI Integration (408/559-8544) costs $159, but it works only with the Apple 12-inch monitor in 16-bit color. For LCs, Envisio (612/339-1008) offers the $595 Quick 16 board, which works with monitors as large as 16 inches. You may even want to run boards designed to run at 24 bits at 16 bits instead, to speed your screen scroll and redisplay time even more.

If you have a Classic right now, or an LC running in 8-bit color, and are planning to step up in the world of 24-bit graphics, you might want to consider getting halfway there instead. A Mac IIvx in 16-bit mode using the new Apple 15-inch color monitor for display produces color that's apparently good enough for Kodak (it's the standard for the Photo CD) and speed that rivals the fastest 24-bit video-display boards on a 19-inch display.

For many people, 24-bit color is overkill, both in terms of what they see and what they pay. Compare the same image in 8-bit, 16-bit, and 24-bit color (from top to bottom). The 8-bit image is decidedly inferior, but the 16-bit image is acceptable for most uses. Those doing color trapping or image editing will still want to work with 24-bit.

mands and essentially no enhancement for other commands. To put these tests in context, Macworld Lab also measured the speedup in real applications; the acceleration for these real-world tests is much more modest, ranging from two to ten times compared with the speed of unaccelerated video display. The real-world tests, by the way, were designed to highlight speed differences; in some common drawing tasks, like updating a complex CAD drawing full of tiny features or filling in a smoothly modulated 24-bit continuous-tone photo, there would be practically no speedup.

MW LAB Gauging Video Speed

REAL-WORLD TESTS

In our real-world tests, the size of the monitor dramatically affects performance for line scrolls: bigger monitors are slower. However, bigger monitors can have an advantage for page scrolls, where all the data on the new page is moved onto the screen in one step. Scrolls are good tests of actual performance because they are common tasks and because they cause the Mac to redraw a range of objects, from text to graphics.

LOW-LEVEL QUICKDRAW TESTS

Low-level tests of QuickDraw command processing show theoretical best performance. The Basic Commands group includes QuickDraw commands that all vendors accelerate. Radius and SuperMac accelerate some other commands, but our tests show that this does not change these boards' performance.

Products are ranked in overall performance order, from fastest to slowest, within each monitor size category. The best in each category is indicated in red.

Vertical Scroll
(in seconds)

Average results for a series of up and down scrolls (one line at a time) in Excel and Word documents.

Horizontal Scroll
(in seconds)

Average results for a series of left and right scrolls (one column at a time) in Excel documents.

Page Scroll
(in seconds)

Average results for a series of up and down scrolls (one screen at a time) in Word documents.

All Commands
(speed compared to Apple 8•24)

Relative performance in processing all 118 QuickDraw commands, using the industry-standard Hydra benchmark.

Basic Commands
(speed compared to Apple 8•24)

Relative performance in processing 25 common QuickDraw commands, using the industry-standard Hydra benchmark.

	Vertical Scroll (in seconds)	Horizontal Scroll (in seconds)	Page Scroll (in seconds)	All Commands (speed compared to Apple 8•24)	Basic Commands (speed compared to Apple 8•24)
With 13-Inch Monitors					
SuperMac Thunder/24	19.2	16.9	8.9	3850%	990%
SuperMac Spectrum/24 PDQ Plus	21.6	18.2	9.1	2010%	600%
SuperMac Spectrum/24 Series III*	28.1	22.0	10.0	730%	290%
RasterOps 24Sx	35.7	32.3	16.3	430%	200%
Radius PrecisionColor 24Xk	33.3	40.4	15.5	610%	280%
Radius PrecisionColor 24X	33.5	40.7	15.7	610%	280%
Radius PrecisionColor 24Xp	35.4	43.3	16.1	560%	250%
E-Machines Futura MX	42.5	36.8	17.5	280%	150%
E-Machines Futura SX	42.7	37.0	17.4	270%	150%
E-Machines Futura LX	43.8	38.0	17.8	270%	150%
Xceed MacroColor II	76.7	53.4	17.5	140%	120%
Apple 8•24GC	95.4	73.0	17.6	120%	110%
Apple 8•24	106.4	68.3	19.4	100%	100%
SuperMac Spectrum/24 Series III	103.1	67.6	20.2	100%	100%
With 16-Inch Monitors					
SuperMac Thunder/24	23.2	20.7	8.1	2970%	800%
SuperMac Spectrum/24 PDQ Plus	28.0	23.1	8.2	1850%	560%
SuperMac Spectrum/24 Series III*	40.0	29.9	9.1	720%	290%
Radius PrecisionColor 24Xk	46.7	59.1	14.7	600%	270%
Radius PrecisionColor 24X	46.7	59.3	14.9	600%	270%
RasterOps 24Mx	55.5	44.5	16.0	380%	180%
E-Machines Futura MX	63.1	49.8	16.6	270%	150%
E-Machines Futura SX	64.2	50.6	16.6	260%	150%
Radius PrecisionColor 24Xp	51.4	65.9	16.7	520%	240%
E-Machines Futura LX	64.0	51.0	16.9	270%	150%
Generation Systems Graphics Card	128.6	81.3	16.6	140%	120%
SuperMac Spectrum/24 Series III	169.2	103.0	18.6	100%	100%
With 19-Inch Monitors					
SuperMac Thunder/24	27.9	26.5	7.8	3390%	890%
SuperMac Spectrum/24 PDQ Plus	37.1	30.8	8.0	1670%	510%
SuperMac Spectrum/24 Series III*	54.2	40.7	8.7	710%	280%
Radius PrecisionColor 24Xk	61.9	84.7	14.3	600%	270%
RasterOps 24XLI	74.2	59.3	15.3	380%	180%
Radius PrecisionColor 24X	62.9	85.5	14.3	600%	270%
E-Machines Futura LX	85.1	66.7	15.8	280%	150%
E-Machines Futura MX	85.3	66.5	15.8	280%	150%
Generation Systems High Resolution	171.8	107.8	15.3	160%	130%
RasterOps Paintboard LI	266.4	158.6	15.0	100%	100%
SuperMac Spectrum/24 Series III	261.8	155.9	18.3	100%	100%
	Shorter bars are better.	Shorter bars are better.	Shorter bars are better.	Longer bars are better.	Longer bars are better.

*With $499 piggyback board installed.

Other Acceleration Techniques

IN ADDITION TO QUICKDRAW acceleration, some vendors tout the use of other techniques, such as RACE (redundant access cycle eliminator), GWorld, and NuBus block transfer. Should you seek out these alternatives? Not really.

For example, GWorld is useful only if you use GWorld-compatible software, of which there is not much. GWorld helps speed display by accelerating the switching between images in some draw programs (like Time Arts' Oasis), but it doesn't count for much as a general video-acceleration technique.

NuBus block transfer—which speeds up the transfer of image data across NuBus by sending it in bursts—was a big deal before all 24-bit accelerated video boards had their own video RAM; but NuBus block transfer hasn't been a selling point since 1991, because onboard VRAM is now typical.

The same is true for RACE, which promises to speed up a standard video board by about 1.2 times by handling video computations more efficiently. But inexpensive QuickDraw acceleration chips are widely available, providing better acceleration at hard-to-beat prices.

All these video-acceleration methods might offer some benefit if used with QuickDraw acceleration, but typically none are advantageous enough to justify the extra expense compared with a QuickDraw-only accelerated video-display board.

Time Is Money

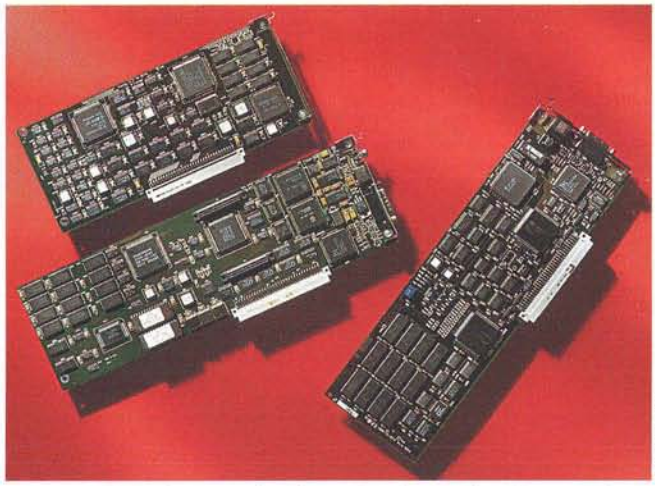
THE TEST DATA, FOR BOTH the real-world tests and raw QuickDraw tests, reveal several issues to consider when choosing 24-bit accelerated video-display boards. For one, the stately progress of the acceleration for larger monitors is so predictable that, given the data for 14-inch and 19-inch monitors, Macworld Lab nearly wasted its time running benchmarks on 16-inch monitors. A 19-inch monitor has about twice the display area as a 14-inch monitor, and an accelerator takes about twice as long to redraw or scroll a 19-inch screen as a 14-inch screen. A 16-inch monitor has about one-third more area than a 14-inch monitor, so an accelerator will take about 1.3 times longer to redraw or scroll its screen compared with a 14-inch screen. Use these ratios to gauge the effects on your display: if you see an accelerated board used with a 14-inch monitor and you'll be using that board on a 16-inch monitor, expect the speedup to be three-quarters of what you see on the 14-inch monitor.

Another finding is that newer designs beat older designs by a large margin, an almost inevitable conclusion in the computer business. SuperMac's accelerated Spectrum/24 Series III handily beats a number of older boards, and is in turn left in the dust by SuperMac's own, newer Thunder series.

Finally, in line with the proverb that time is money, a look at "Comparing 24-Bit Video-Display Boards" will show you that faster boards just cost more, as you would expect. Comparing two of the best-known companies in the Mac graphics business—Radius and SuperMac—the very fastest board, SuperMac's Thunder/24, costs $2000 more than the fastest Radius board (the PrecisionColor 24Xk). But the Thunder/24 is in fact impressively faster—to get the most performance for the least price your best approach might be to shop aggressively for the best deal on a Thunder/24.

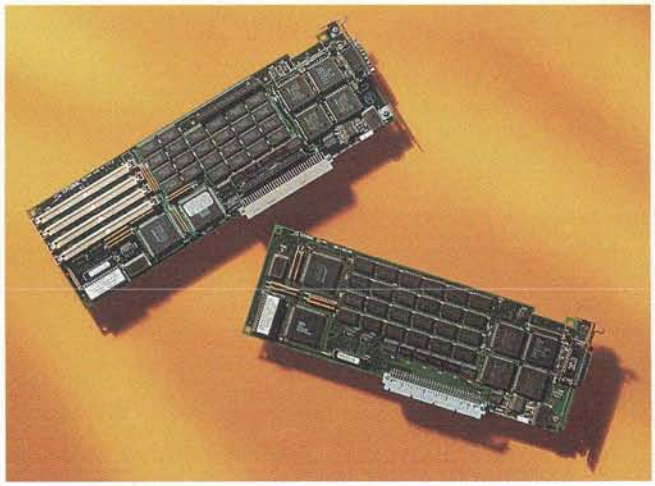
Beyond Acceleration

THE FIRST ROUND OF 24-BIT accelerated video-display boards a few years ago offered improved screen-display speeds, but not much else. Now the extra features and different expansion options on today's boards may be their most important selling points. Special hardware for accelerating Adobe Photoshop, chips for JPEG compression/decompression, and interfaces to video equipment—just to name some common possibilities—may turn out to be more important to you than a 15 percent speed difference between comparably priced boards. Two manufacturers—SuperMac and RasterOps—let you use plug-in boards that go into the video-display boards' piggyback slots to add such features, as "Comparing 24-Bit Video-Display Boards" shows. This saves you from using a NuBus slot on the Mac for the features.



MARK JOHANN

No One-Trick Ponies To reduce the number of NuBus slots taken, several vendors offer video-display boards that provide other features. The E-Machines ColorLink SX/T (bottom) includes Ethernet with its accelerated 24-bit video support. RasterOps offers special-purpose boards, like its PhotoPro (top) for Photoshop acceleration, that work with a general-purpose board, like its 24STV (middle); the special-purpose board is cheaper but still requires two NuBus slots.



MARK JOHANN

Fastest Displays SuperMac offers the best accelerated 24-bit video-display options. The Thunder/24 (top) is the fastest board available, while the Spectrum/24 PDQ Plus (bottom) offers high speed at an attractive price.

Photoshop Acceleration

Simple QuickDraw acceleration isn't going to buy you

much speed for bitmap-oriented applications like Photoshop. You'll need either a more expensive board that includes both video acceleration and Photoshop-filter acceleration (like the $3699 ThunderStorm Pro from SuperMac), or a cheaper board with no video acceleration but hardware support for Photoshop speedup (like the $999 SuperMac ThunderStorm).

Common Photoshop operations (sharpen, unsharpen, blur, Gaussian and motion blur, and resize) pick out a block of pixels and perform arithmetic on the whole block. This means, for example, that a Gaussian blur can call for 20 million operations on a 1MB picture—and the operations aren't QuickDraw calls, so an accelerated video-display board won't help speed things up. But all these filtering tasks have been familiar for decades to companies that design digital signal processing (DSP) equipment, and several off-the-shelf chips are ideal for these computations. Several vendors claim their boards improve Photoshop filter speed from 5 to 20 times.

JPEG Compression If JPEG is important in your work, you will also need either a dedicated JPEG board or a multipurpose DSP board (see "Image Compression Matures," *Macworld*, March 1992). Once again, plain QuickDraw acceleration won't speed up JPEG compression/decompression.

It also happens that the same DSP chips are also just right for speeding up JPEG compression/decompression, so you'll find that boards that can accelerate Photoshop filters nearly always accelerate JPEG jobs. Some of the original chips and software developed by the JPEG pioneers at Storm Technology now appear in SuperMac's $999 ThunderStorm boards. The $895 Lightning Effects DSP board from Spectral Innovations (408/727-1314) not only accelerates Photoshop and JPEG jobs, but ColorStudio and QuarkXPress as well. Newer Technology (316/685-4904) offers the Image Magic board ($995 for NuBus, $895 for Quadras) based on the same DSP chip used in the Lightning Effects board but with different filters. DayStar Digital (404/967-2077) recently announced a version of the Storm Technologies board that uses DayStar's own filters.

QuickTime Options Finally, if you do lots of QuickTime work, you are not only out of the world of big monitors but also out of the domain of the video-display boards reviewed here (for a definitive article on Mac video, see "The Full-Motion Macintosh," *Macworld*, January 1993). There are 24-bit video-display boards with QuickDraw acceleration that specialize in motion; "Multifunction Board Options" lists the capabilities of several. The video-display boards we tested are aimed at users of still images, such as graphic artists, engineering designers, and desktop publishers.

COMPARING 24-BIT VIDEO-DISPLAY BOARDS

Company	Product	Tested by Macworld Lab	List Price	Hardware Zoom	Extended Desktop	Number of Piggyback Board Slots	ACCELERATION	
							QuickDraw	Other
Apple Computer	8•24	●	$699	○	○	0	○	○
	8•24GC	●	$1499	○	○	0	●	○
E-Machines	Futura LX	●	$1299	●	●	0	●	○
	Futura MX	●	$999	●	●	0	●	○
	Futura SX	●	$599	●	●	0	●	○
Generation Systems	Graphics Card	●	$1079	○	○	0	○	○
	High-Resolution Graphics Card	●	$1149	○	○	0	○	RACE
Lapis Technologies	ProColorServer II 24[3]	○	$799	○	○	0	○	○
Radius	PrecisionColor 24X	●	$1999	○	○	0	●	NBT[6]
	PrecisionColor 24Xk	●	$999	○	○	0	●	NBT[6]
	PrecisionColor 24Xp	●	$599	○	○	0	●	NBT[6]
RasterOps Corporation	24Mx	●	$1499	●	●	1	●	GWorld
	24Sx	●	$799	●	●	1	●	GWorld
	24XLI	●	$2499	●	●	1	●	GWorld
	Paintboard 24	○	$1999	●	●	0	●	○
	Paintboard LI	●	$999	●	●	0	●	○
SuperMac Technology	Spectrum/8•24 PDQ	○	$999	●	●	0	●	○
	Spectrum/24	○	$899	●	●	0	●	○
	Spectrum/24 PDQ Plus	●	$1999	●	●	0	●	○
	Spectrum/24 Series III	●	$999	●	●	0	●	○
	Spectrum/24 Series IV	○	$999	●	●	0	●	○
	Thunder/24	●	$2999	●	●	1	●	GWorld
	ThunderLight	○	$2399	●	●	0	●	○
Xceed Technology	Xceed MacroColor II[7]	●	$569	○	●	0	○	○

● = yes; ○ = no. Technical-support ratings are based on a series of calls made by Macworld *staffers posing as customers to each company to gauge the accessibility, helpfulness, products, and we call only those companies whose products Macworld Lab tests. [1] Support offered only through dealers. [2] Supports this resolution at 8-bit color. [3] Versions also*

Speedup Strategies

SUPERMAC'S THUNDER OFFERS the fastest 24-bit video-display boards you can buy. The boards cost more, but the marketing people at SuperMac appear to have successfully targeted an audience of affluent and very impatient graphics professionals. The second-fastest board tested, for $1000 less, is the SuperMac Spectrum/24 PDQ Plus. And the third-fastest is the SuperMac Spectrum/24 Series III.

If these prices are too rich for your blood, you might consider a less-lofty strategy in which you compensate for slightly slower display speeds by using a smaller monitor—a 15-inch or 16-inch monitor makes an intrinsically slower board seem considerably better. Furthermore, a perusal of mail-order ads in *Macworld* reveals a nearly 30 percent discounted price for all these accelerated video-display boards, so in comparing speed results in "Gauging Video Speed" and the prices in "Comparing 24-Bit Video-Display Boards," you need to write in your own best-case street price before making a purchase. Because the Macworld Lab results show a fairly direct link between speed and price, you should insist on seeing a demonstration of a video-display board–Mac combination running your typical applications to find a speed you think is acceptable and match it to your budget.

And if you want 24-bit color for less-ambitious uses, should you consider an unaccelerated board like those from Apple, Generation Systems, Lapis Technologies, or Xceed Technology? Maybe so, if your main focus is reviewing rather than editing or retouching color images. Acceleration is expensive and not always meaningfully faster—for occasional 24-bit-image work, 3-times faster scroll speed probably won't change your life.

No matter which board you pick to meet your need for video speed, don't worry about the color quality. The monitor will make the difference there; the video-display boards aren't a factor because they all use the same component (a Brooktree digital-to-analog converter) calibrated the same way to determine the color values sent to your monitor. **m**

CHARLES SEITER is a *Macworld* contributing editor who designs graphic displays for scientific imaging applications.

Macworld Lab testing supervised by TIM WARNER.

MW EDITORS' CHOICE

Spectrum/24 PDQ Plus; Thunder/24 Serious acceleration costs about $2000. This means that the Spectrum/24 PDQ Plus is a best buy for raw speed and the Thunder/24 represents a reasonable price for the most acceleration you can buy.
Company: SuperMac Technology.
List prices: Spectrum/24 PDQ Plus $1999; Thunder/24 $2999.

Video RAM Expandable	SUPPORTED RESOLUTIONS (AT 24-BIT COLOR) 640 × 480	832 × 624	1024 × 768	1152 × 870	On-the-Fly Resolution Switching	Tech-Support Rating	Consumer Contact: Toll	Consumer Contact: Toll-Free
○	●	○	○	○	○	[1]	408/996-1010	NA
●	●	○	○	○	○	[1]		
○	●	●	●	●	●	very good	503/646-6699	800/344-7274
○	●	●	●	○	●	very good		
○	●	●	○[2]	○	●	very good		
○	○	●	○	○	○	satisfactory	612/633-5222	800/654-5294
○	○	○	●	○	○	satisfactory		
○	●	●	○[4]	○[4]	●[5]	excellent	510/748-1600	800/435-2747
○	●	●	●	●	●	very good	408/434-1010	800/227-2795
○	●	●	●	○	●	very good		
○	●	●	●	○	○	very good		
○	●	●	○	○	●[5]	good	408/562-4200	800/729-2656
○	●	○	○	○	○	good		
○	●	●	●	●	●[5]	good		
○	●	●	●	●	●[5]	good		
○	●	●	●	○	●[5]	good		
○	●	○[4]	○[2]	○[2]	●	satisfactory	408/245-2202	800/334-3005
○	●	●	●	●	●	satisfactory		
○	●	●	●	●	●	satisfactory		
○	●	●	●	●	●	satisfactory		
○	●	●	●	●	●	satisfactory		
○	●	●	●	●	●	satisfactory		
○	●	●	●	●	●	satisfactory		
○	●	○	○	○	○	excellent	313/727-4085	NA

and accuracy of their support technicians. Macworld uses a point system, including bonuses and demerits, to derive the final rating. Ratings are for companies, not individual available for SE/30 and LCs ($799). [4] Supports this resolution at 16-bit color. [5] Restart of Mac required. [6] NuBus block transfer. [7] Version also available for SE/30 ($599).

Software Secretaries

PUT YOUR LIFE IN ORDER WITH ONE OF THESE PERSONAL INFORMATION MANAGERS

BY FRANKLIN N. TESSLER

Remembering all the details of day-to-day life used to be easy—addresses, appointments, and phone numbers came to me effortlessly, and I wouldn't think of taking a shopping list to the store. With middle age creeping up, though, I sometimes need help remembering the time of the next staff meeting or what my wife asked me to pick up on my way home. And judging by the thriving sales of paper-based personal organizers like Day Runner and Franklin Planner (no relation), I'm not the only one who finds it hard to keep a handle on a hectic schedule: Day Runner Corporation estimates that it has sold more than 6 million units since 1982, and sales continue to climb.

As always, software vendors want us to believe that what paper can do, computers can do better. In just a couple of years, their efforts have created a market for a new type of software called personal information managers, or PIMs. For this article, I took a comprehensive look at the current crop of PIMs for the Macintosh. As you'll see, I discovered that despite their many rough edges, PIMs can still be very handy to have around.

What's in a PIM?

UNFORTUNATELY, EXPERTS DO NOT AGREE on what a PIM is—vendors conveniently base their definitions on the capabilities of their products, not on any widely held opinion. In preparing for this article, I examined a diverse array of Macintosh applications and desk accessories (DAs). To keep things manageable, I narrowed the scope to include software that incorporates three major functions: keeping track of contacts (names, addresses, and other information about people), calendar and event planning (organizing and viewing schedules), and to-do management (maintaining lists of tasks). Eight programs meet these criteria: ACT for Macintosh, Connections, DateBook/TouchBase (a combination desk accessory and application), DayMaker, Info-Mation, OfficeMaster, The Nine to Five Office, and Shortlist.

In addition to examining major features, I compared flexibility in viewing data; printing; importing and exporting; speed; and overall reliability (see "PIM Roundup"). In the spirit of the

STEVE LYONS

word *personal* in personal information manager, I didn't consider multiuser capabilities. Because my definition of PIM may differ from yours, several products that are often referred to as PIMs are described in "PIMs at a Glance." Also listed are a number of PIMs that arrived too late to be included in this article.

Contact Management

EVEN DIE-HARD COMPUTERPHOBES ARE USUALLY willing to concede that computers are ideal for maintaining address lists. If you are like most people, though, typing information about business associates, friends, relatives, and other personal contacts is about as pleasant as filling out a tax return. Fortunately, good software design can help make the job easier, if not enjoyable.

EVEN DIE-HARD COMPUTERPHOBES WILL CONCEDE THAT COMPUTERS ARE IDEAL FOR MAINTAINING ADDRESS LISTS

All the PIMs but DayMaker include an entry screen for contacts, with defined spaces for names, addresses, phone numbers, and other information. DayMaker requires you to enter contact data as free text, so it doesn't distinguish between a person's last name and company, for example. Although that's not a problem if you're just browsing, it does make it difficult to export contact data to a database or print out a formatted address list.

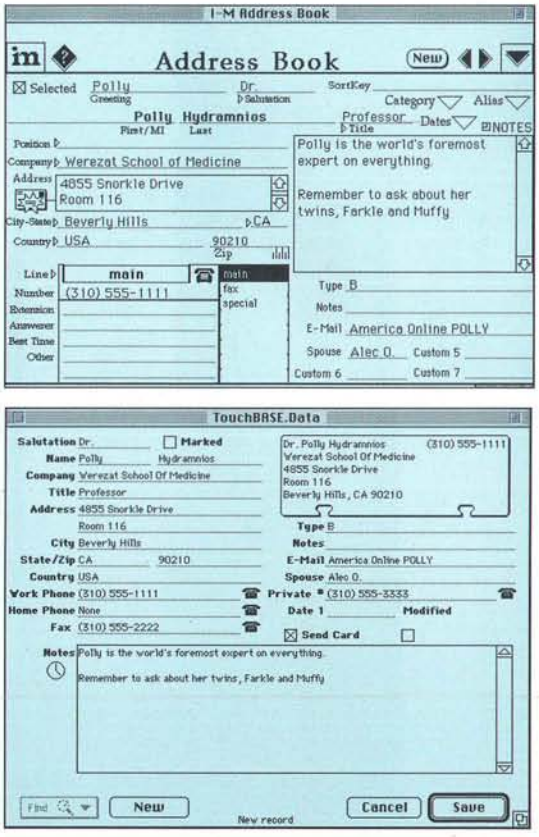
In PIMs, contact management runs the gamut from simple to complex. Some address books, like the one in Info-Mation, are so brimming with fields and pop-up menus that they are difficult to read. At the other extreme, Shortlist's simple setup doesn't let you customize data entry at all, so you can not modify any of the fields to suit your needs. TouchBase strikes a sensible balance between flexibility and ease-of-use—TouchBase's entry form provides 5 custom fields in addition to 14 standard ones (see "Great Contacts"). ACT, with more than 70 fields, is even more flexible. In addition to changing field names, you can lock any field to prevent users from entering information, or hide a field from view entirely.

Automatic formatting and data entry, features common to high-end database applications, can help cut down on keystrokes. For example, TouchBase can form at telephone numbers and capitalize names for you the instant you finish typing them in. ACT lets you create lists of predefined entries to choose from as you enter data, and you can specify default values for any field. Unfortunately, none of the PIMs do an ideal job of inspecting for missing or incorrect data, an area that's begging for improvement.

Most PIMs provide special fields that let you categorize contacts, useful for preparing mailing lists. For example, if you assign a unique identifier to all your business associates, you'll have an easier time printing a set of personalized announcements for the company picnic. Most PIMs also let you browse through your address book and mark selected records (usually by clicking on a check box), a handy way to temporarily segregate a subset of contacts.

Another helpful function lets you link events (like telephone calls and meetings) to specific contacts. Connections implements this feature especially well: when you dial a contact's phone number, a comprehensive log sheet pops up on your screen. If the line is busy, you can automatically schedule a reminder to make a follow-up call by clicking on a button. Shortlist also lets you link events to people: when you schedule an event, you can select associated contacts from a scrolling list, a workable solution as long as the size of your address book remains manageable. ACT actually requires you to associate activities with one or more contacts, a restriction I found bothersome.

Because TouchBase (a DA) and DateBook (an application) are separate programs, they're not as well integrated as the other PIMs. And since they communicate by sending Apple events, linking is available only if you're using System 7. For example, you can search for contacts in a TouchBase data file without leaving DateBook, but you can only scan by first name, last name, or company. When you schedule an event in DateBook, you can transfer selected information about the event (such as time and description) into TouchBase records that meet your search criteria.



Great Contacts Info-Mation's address book is flexible, but I found the layout made it confusing to read (top). TouchBase's contact entry form (bottom) includes five fields you can customize to store information that the standard fields cannot handle.

Calendars and Events

OF ALL THE ARGUMENTS IN FAVOR OF USING A PIM, activity planning may be the most compelling, especially if you often shuffle meeting times and dates. A well-designed PIM should let you examine your event

PIMs at a Glance

To make your PIM shopping easier, here are thumbnail sketches of the eight PIMs reviewed in this article, as well as several PIMs that weren't available in time to be included. This section also features brief descriptions of a few programs that don't meet my criteria for PIMs, but are often described as personal organizers. (Other organizers abound; for a look at address books, see *The Desktop Critic* in this issue; calendar programs will be the subject of a future *Macworld* article.)

PIM Reviewed in this article.

PIM Meets article's definition of a PIM (contact database, calendar, and to-do list), but wasn't available in time for review. Description is based on information provided by manufacturer.

PIM Doesn't meet article's definition of a PIM, but is commonly referred to as a PIM.

PIM **ACT for Macintosh 1.0** (Contact Software International; 214/919-9500, 800/365-0606; $395)

ACT is a full-featured PIM that integrates contact-management, scheduling, and word processing. It has more contact fields than its competitors do, and gives you a wide variety of options for viewing the contact database. ACT also has several unusual features, including a macro recorder as well as links to a separate product called GeoQuery that works with ACT to let you display contact information on maps.

PIM **Active Memory 2.0** (ASD Software; 714/624-2594; $199)

Active Memory is an activity planner with a spreadsheetlike format and multiple pop-up menus to speed data entry. Network support lets you coordinate projects among multiple users. (See *Reviews, Macworld,* August 1992.)

PIM **Ascend 3.0** (Franklin Quest; 801/975-9992, 800/877-1814; $199)

Ascend incorporates calendar, contact, and to-do features in an application geared for users of the paper-based Franklin Planner organizer. You can attach notes to contacts in the program's address book, assign priorities to items in a to-do list, and print out pages for the Franklin Planner.

PIM **Connections 2.1** (Concentrix Technology; 415/358-8600; $199)

This HyperCard-based PIM includes daily and monthly calendars, a telephone directory, and a reference library, which lets you archive text (such as correspondence). You can customize the telephone directory by modifying, adding, deleting, or moving fields. The program also offers an optional link to the Sharp Wizard.

PIM **Data-Areas 1.0** (Numa Technology; 203/256-1973; $59)

Numa's PIM combines a calendar, contact management, and to-do management in a low-cost package. The free-form contact section lets you set up custom formats. A separate Activities view shows current to-do items by category, and a notes module lets you store miscellaneous information.

PIM **DateBook 1.5.1 andTouchBase 2.0** (After Hours Software; 818/780-2220; $125 each; $169.95 for both)

Although DateBook (a calendar application) and TouchBase (a contact-management DA) are separate programs, they can share information under System 7. (After Hours Software bundles the programs.) DateBook lets you view your schedule in daily, weekly, or monthly format, and its support for recurring events is top-notch. TouchBase is an address book with five customizable text fields and automatic formatting of text and phone numbers during data entry.

PIM **DayMaker 1.01** (Pastel Development; 212/941-7500; $99.95)

DayMaker focuses on schedule management by having you organize items (which can be activities, to-dos, or contacts) in a hierarchical fashion. It offers multiple options for display and output, including Gantt charts, as well as flexible event-scheduling and handling of uncompleted to-dos. Printing options support popular paper-based planners.

PIM **DayMaker 2.0** ($129.95) This version of DayMaker, which shipped too late to review, adds support for recurring events, a separate to-do view, and disk-based file storage to minimize RAM usage.

PIM **First Things First 3.0** (Visionary Software; 503/246-6200, 800/877-1832; $79.95)

This system extension lets you categorize and schedule tasks and set reminders. First Things First displays a clock on your desktop; an alarm sounds for one-time or recurring reminders. (See *Reviews,* April 1992.)

PIM **In Control 1.1** (Attain Corporation; 617/776-1110; $129.95)

In Control lets you manage to-do items using an outline that's organized in rows and columns. The program offers powerful search and sort capabilities. (See *Reviews,* May 1992.) Version 2.0 will include a calendar view, check boxes for completed to-do items, and scripts to automate common actions.

PIM **Info-Mation 1.1g** (Info-Mation; 510/559-4211, 800/ 444-4746; $189)

This HyperCard-based PIM includes an address book, contact log, calendar, and a group scheduler. Info-Mation's project planner module enables you to organize all the activities associated with a project, while the group scheduler is useful for comparing the schedules of several users.

PIM **Intouch 2.0.4** (Advanced Software; 408/733-0745; $99.95)

The newest version of Intouch is built around an address book that lets you enter contact information as free text, rather than using defined contact fields as do many competitors. Intouch also provides calendar and schedule management. (See *Reviews,* March 1992.)

PIM **The Nine to Five Office 2.0** (Nine to Five Software; 303/443-4104; $99.95; $19 through Sept. 1993)

This HyperCard-based PIM incorporates contact and calendar management. With Nine to Five's $19 special offer, The Nine to Five Office is ideal for users who want to explore a PIM at a bargain-basement price. The program includes a map view that lets you look up contacts by region.

PIM **OfficeMaster 2.0.4** (Cornice Software; 714/985-8323; $195)

The personal version of OfficeMaster includes a contact manager, a reminder system, and a calendar with weekly and daily schedule views. Cornice's main product, however, is the multiuser version of OfficeMaster—in addition to all the features in the single-user program, it lets you manage event calendars for several people and send electronic memos over a network.

PIM **PowerTeam 1.0** (Provue Development Corporation; 714/892-8199; price unavailable)

Based on Provue's Panorama database application, the PowerTeam PIM includes the requisite calendar, contact, and to-do features, as well as some unusual features such as a checkbook, expense report form, and calculator.

PIM **Shortlist 1.01** (Brainchild; 513/831-8451; $149)

Shortlist incorporates a simple contact manager along with a system for scheduling meetings, mail, phone calls, and to-dos, as well as a daily agenda and multiday calendar view. Shortlist is ideally suited to PowerBooks and other portable Macs, and according to Brainchild, the software is designed to maximize battery life.

PIM **ThoughtPattern 2.0** (Bananafish Software; 415/929-8135, 800/552-5939; price unavailable)

This upgrade adds calendar functions and a field-oriented address book to ThoughtPattern's free-form note-taking and file-linking capabilities.

PIM **TimeVision 1.0** (Powercore; 815/468-3737; $99):

Focusing on time management, TimeVision offers monthly, weekly, and daily schedule views, and also includes a Note Card file for storing addresses and other text. You can assign up to 64 custom categories to events, and attach alarms to them for reminders.

calendar from any perspective, ranging from a broad overview to a daily agenda. And it shouldn't take more than a few mouse-clicks or key-presses to book an event, whether it's one day or one decade in the future.

ACT, DateBook, and DayMaker provide the most-flexible calendar options, letting you survey your schedule a day, a week, or a month at a time; DateBook also includes a year view in the form of a scrolling monthly display. All three applications let you toggle between views by clicking on icons. I especially like DateBook's monthly calendar banners, colored overlays that you use to mark special events that last more than one day (see "A Banner Year").

IF YOU USE A PIM FOR BUSINESS AND PERSONAL SCHEDULES, FLEXIBILITY IN CATEGORIZING EVENTS IS A MUST

Calendar displays in the remaining PIMs are all limited. For example, OfficeMaster's weekly calendar shows events as color blocks, and its monthly view doesn't give any event information at all. The calendar in Connections would be more useful if it weren't so difficult to schedule and view events for future years: unlike with other PIMs, you have to build each year's calendar separately, a process that can take five to ten minutes.

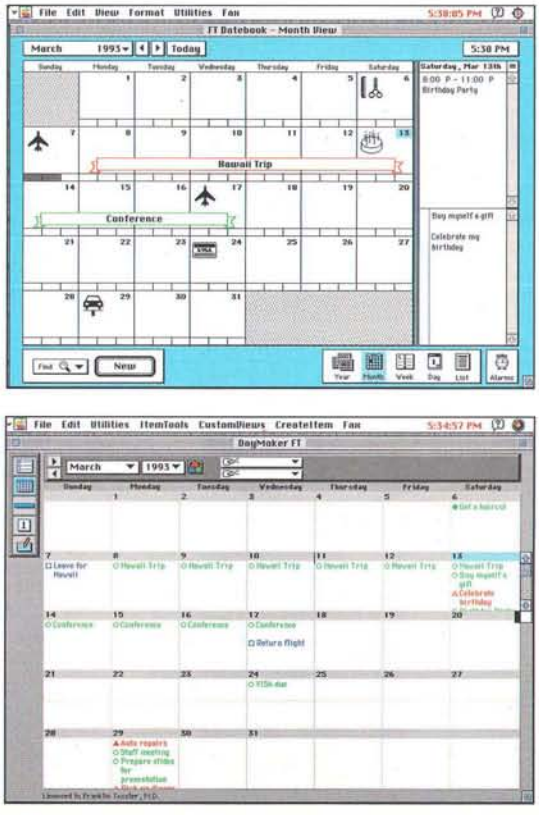
If you use a PIM to handle business and personal schedules, flexibility in categorizing events is a must. For example, you might define lunches with clients as one event type and meals with friends as another event type. Shortlist and ACT for Macintosh take a fairly rigid approach to scheduling events by making you choose from a limited number of categories (calls, meetings, mail, and to-dos in the case of Shortlist; calls, meetings, and to-dos in ACT).

All the PIMs let you schedule events that have specific dates, times, and durations, although their approaches differ. Usually you pick a day and starting time for the event and type in a brief description. Connections and Info-Mation also let you change event times and durations by dragging bars along a time line, an option that some users may prefer. Scheduling events in The Nine to Five Office is especially awkward—you enter the event's description next to its start time, select the text, drag until you reach the end time, and click on a button—it is more cumbersome than typing start and end times.

I found DateBook's event-scheduling function the easiest to use of all the PIMs. For each new event, you type a description, a summary, a start time, and an end time or duration. (You only have to enter the end time or the duration, and DateBook calculates the other one for you automatically.) The only drawbacks are DateBook's lack of support for events that have no predetermined duration (like visits to the dentist). DayMaker provides more flexibility in event scheduling than DateBook does, but I found its interface less intuitive and harder to master.

Some PIMs let you book recurring events like birthdays and mortgage payments. Overall, I found DateBook's recurring-event function the most practical: you can schedule events to occur at specific intervals (every four days), on specific dates (the tenth of the month), or on specific days of the month (the third Thursday of every month). When you alter any aspect of a recurring event (the description, for example), you're given the option of applying the changes to as few or as many of the posted events as you like.

Of course, scheduling an appointment with your boss to ask for a pay raise (another good example of a recurring event) is only half the battle: you have to remember to show up for the meeting, which is why an efficient alarm system is vital. For maximum effectiveness, reminder alarms should go off no matter what you're doing on the Macintosh, even if your PIM isn't up and running. All the PIMs with pop-up alarms use INITs—system extensions if you're running System 7—to make reminders appear on your screen. Only DateBook gives you the option of setting alarms to ring at a given date and time or at a specified interval before the event; reminder functions in the other PIMs aren't quite as flexible. When a DateBook alarm appears, you can cancel it forever or postpone it an arbitrary number of minutes, hours, or days, just the way you use the snooze button on an alarm clock.



A Banner Year Colored banners can be used to mark multiday events in DateBook's monthly view (top), while icons denote one-day events. Event and to-do lists are displayed in a separate area to the right. In DayMaker's monthly view (bottom), event data appears on the calendar itself.

What to Do

IF YOU'RE LIKE MOST BUSY PEOPLE, YOUR DESK and refrigerator are constantly cluttered with lists of things that need attention. Unlike events, which typically have a specific date and time, to-do items (like painting the garage) are often free-floating: you get to

them whenever you find the time. Fortunately, a PIM can help by nagging you until you take care of the chore or give up and delete it entirely.

Most personal information managers treat to-do items as special types of events. In DateBook, for example, to-dos have a date but no starting time or duration. Uncompleted to-do items are automatically carried over to succeeding days, and they remain on your calendar until you get rid of them. (All the PIMs let you retain completed to-dos for later review, however.) As with events, you can set an alarm to ring before an item becomes due. DayMaker is even more flexible, letting you push uncompleted to-dos forward one day, one week, or one month at a time, in addition to setting advance warnings.

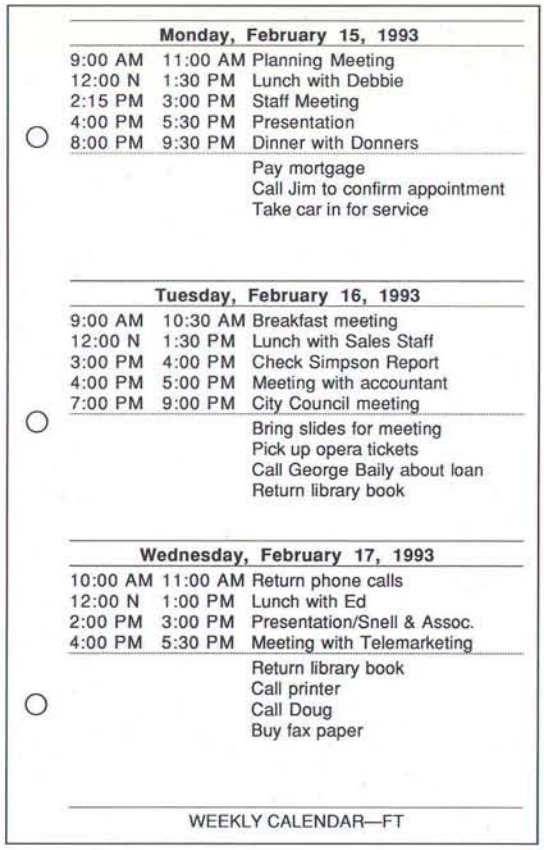
Other Considerations

AS WE'VE ALREADY SEEN, MULTIPLE CALENDAR formats are essential for managing a busy schedule. Similarly, flexibility is also important when it comes to displaying lists of contacts or events. For example, TouchBase lets you browse through your address book entry by entry, or you can view any subset of your contacts in a multicolumn format. In similar fashion, DateBook enables you to display events and to-dos sorted by category, a good way of prioritizing your schedule. A handy view found only in The Nine to Five Office lets you find contacts by clicking on a map of the United States, as well as look up zip and area codes.

For the truly compulsive, DayMaker provides an impressive array of display options, ranging from simple text notes to Gantt charts. You can assign multiple hierarchical tags or categories to events and notes to help you organize them. It's a highly effective system if you're willing to make the effort to use it. ACT also includes multiple layouts for viewing contact information, calendars, and tasks.

If you've invested time compiling an address book using a database manager or other program, import and export capabilities are an important consideration. Fortunately, all the PIMs I reviewed let you import and export contact data as tab-delimited text files, a format that's compatible with most word processors, databases, and spreadsheets. It's not as convenient as importing data directly, but it's a lot easier than retyping hundreds of names and addresses.

Flexible printing options are essential if you use a paper-based daily planner in addition to the PIM in your Mac. If the pages in your organizer are smaller than standard letter size (and they usually are), it's important to cram as many pages as possible onto each



Monday, February 15, 1993

9:00 AM	11:00 AM	Planning Meeting
12:00 N	1:30 PM	Lunch with Debbie
2:15 PM	3:00 PM	Staff Meeting
4:00 PM	5:30 PM	Presentation
8:00 PM	9:30 PM	Dinner with Donners

Pay mortgage
Call Jim to confirm appointment
Take car in for service

Tuesday, February 16, 1993

9:00 AM	10:30 AM	Breakfast meeting
12:00 N	1:30 PM	Lunch with Sales Staff
3:00 PM	4:00 PM	Check Simpson Report
4:00 PM	5:00 PM	Meeting with accountant
7:00 PM	9:00 PM	City Council meeting

Bring slides for meeting
Pick up opera tickets
Call George Baily about loan
Return library book

Wednesday, February 17, 1993

10:00 AM	11:00 AM	Return phone calls
12:00 N	1:00 PM	Lunch with Ed
2:00 PM	3:00 PM	Presentation/Snell & Assoc.
4:00 PM	5:30 PM	Meeting with Telemarketing

Return library book
Call printer
Call Doug
Buy fax paper

WEEKLY CALENDAR—FT

Paper Output Most PIMs let you print pages that fit in popular paper-based planners such as Day Runner or Franklin Planner. This page was printed from After Hours Software's DateBook, on special paper designed to fit in the Day Runner planner.

PIMs on the Go

Paper-based planners are attractive for people who want to stay organized away from the desktop: they're cheap, widely available, and you can use them almost anywhere. Still, a paper organizer can never provide the functionality of a software PIM—try to find all your appointments with Bob Cratchit during the upcoming year and you'll see what I mean.

For several years, an intermediate solution has been available in the form of hand-held organizers from companies like Sharp, Casio, and Oregon Scientific. While they're not as sophisticated as the Newton Personal Digital Assistant announced by Apple last spring, hardware PIMs can be very effective for managing contact lists, notes, and schedules.

For almost two years, I've been using Sharp's OZ-8000 Wizard organizer to keep track of my contacts and appointments. With a little effort, it fits into a shirt or coat pocket, and the durable case has held up well. The 40-character LCD display is quite legible, although it lacks backlighting. Unlike some other hand-held PIMs, the 8000 series organizers sport QWERTY-style keyboards.

Connections and TouchBase enable you to share data with the Wizard through a special interface cable that plugs into the Macintosh serial port (the cable is available separately from Sharp). Connections allows two-way data transfer between the Wizard and the Macintosh; TouchBase lets you export contact information only to the Wizard, and can not import data directly. Several PIM vendors I spoke to hinted that enhanced connectivity may be incorporated in future updates to their software.

Sharp also has introduced a new version of its Macintosh software that's designed to work with its series of electronic organizers. While it's not a full-fledged PIM, Organizer Link II does let you import data, edit it, and export it back to the organizer with a minimum of bother. Schedules and other data are displayed on the Macintosh exactly as they appear on the organizer's screen. For now, it's the best way to back up and archive data.

printed sheet to avoid wasting paper. If you buy specially perforated sheets (available from some PIM vendors and office supply stores), you can avoid the chore of cutting the pages apart once they're printed (see "Paper Output").

Output capabilities range from Shortlist's printed duplication of on-screen information to DayMaker's sophisticated printing options, which let you customize the size and layout of multiple tiny "virtual pages" on each sheet of paper. DayMaker comes with predefined settings for Filofax and Franklin Planner organizers. DateBook and TouchBase also include settings for several paper organizers, including Filofax, Day Runner, and Day-Timer.

IF YOUR PAPER ORGANIZER IS SO JAMMED THAT IT'S IMPOSSIBLE TO FOLLOW, IT'S TIME TO CONSIDER A PIM

Although speed and reliability are critical to any type of software, they're especially important with personal information managers. You might tolerate short pauses when you're working with a word processor or spreadsheet, but a PIM should serve up phone numbers or appointments the instant you need them. With few exceptions, PIMs do their job without much fuss or delay.

To gauge their speed, I ran the PIMs under a variety of conditions, ranging from heavy CPU loads with multiple background processes, to less-demanding situations. Overall, the HyperCard-based PIMs (Connections, Info-Mation, and The Nine to Five Office) fared the worst. Even under relatively light conditions on a Macintosh IIfx, they often felt sluggish, especially when switching between modules or views. And while DayMaker was generally very fast, there was a noticeable delay as the data file was loaded into memory each time I opened it.

I tested reliability by running the PIMs on a stable system loaded with a moderate number of extensions, and found all of them to be acceptably dependable. I encountered a few glitches in Connections' directory module, but they weren't consistently reproducible. According to Concentrix Technology, scripting problems that plagued earlier versions of Connections have been eliminated from the current release. (For an alternative opinion, though, see *Reviews, Macworld*, November 1992.)

Remember that an extensive list of features may not be the primary consideration if you're choosing a PIM for a PowerBook. Despite the newer models' larger memory capacities and hard drives, you should still look for programs that use RAM efficiently and take up little disk space. Conserving precious power also is essential to maximize battery life when you're far from an AC outlet, and that means minimizing disk access. While Shortlist wasn't my favorite choice for desktop use, its speedy performance made it seem right at home running on my PowerBook 170.

Strategies for Success

DESPITE THEIR IMPRESSIVE FEATURE SETS, PIMS aren't for everyone. While PIM software can help you work more efficiently, you may be perfectly happy with the paper-based organizer you're using now. And the word processor, outliner, or flat-file database that you already own may be sufficient for keeping track of contact information, agendas, and notes. But if your

PIM ROUNDUP

Product	Company	Contact Management	Calendar Functions
ACT for Macintosh 1.0	Contact Software International	Multiple layout options. More fields than other PIMs.	Weekly, daily, and monthly views.
Connections 2.1	Concentrix Technology	Automatic telephone logging.	Each year's calendar must be built separately.
DateBook 1.5.1	After Hours Software	Can retrieve limited contact information from TouchBase under System 7.	Weekly, daily, and monthly vews. Can use banners to mark multiday events.
TouchBase 2.0	After Hours Software	Flexible contact entry with automatic formatting and five custom text fields.	NA
DayMaker 1.01**	Pastel Development	Contact information must be entered as free text.	Weekly, daily, and monthly views.
Info-Mation 1.1g	Info-Mation	Address book can be hard to read.	Can view schedule by month or user-specified range of days.
The Nine to Five Office 2.0	Nine to Five Software	Includes separate spaces for home, office, and billing information.	Weekly and daily views only.
OfficeMaster 2.0.4	Cornice Software	Simple contact entry form. Limited searching. Provides event history.	Weekly calendar doesn't display event information automatically.
Shortlist 1.0.1	Brainchild	Contact fields cannot be customized.	Daily schedule view includes Gantt charts.

*NA = Not applicable. * Independent of application ** See "PIMs at a Glance" for information on version 2.0, which arrived too late to review.*

paper organizer is so jammed with addresses, appointments, and to-dos that it's impossible to follow, or if you find yourself missing important meetings, then it's time to consider a computer-based personal information manager. (If you're budget-conscious, The Nine to Five Office is available through September 1993 at the unbeatable price of $19.)

Once you've settled on a PIM, the next step is to devise a strategy for making the most of it. If you run the PIM on a single desktop computer at home or at the office, you'll need some way to carry information with you when you're away from the Mac. The cheapest approach is to print addresses, appointments, and notes on pocket-size pieces of paper or index cards. A slightly more expensive solution is to print on pages that fit into a compact daily planner like Day Runner. If you can afford them, hardware PIMs like the Sharp Wizard and the Casio BOSS also offer portability (see "PIMs on the Go").

If you have two or more desktop Macintoshes to contend with, or if you use a desktop machine and a notebook Macintosh, the biggest hurdle is making sure that the data at both ends is always up-to-date. PIM files are likely to change often during the course of a busy day as appointments and deadlines come and go. Although it's possible to reconcile data files manually (by using floppies, for example), you're courting disaster unless you're very careful. Several companies, including Inline Design, offer utilities that automatically synchronize files on several machines to keep data current.

The most efficient way to use a PIM is to have it load at start-up and keep it running in the background under MultiFinder or System 7—you shouldn't have to launch an application or open a DA every time you need to find an address or schedule a meeting. You should also count on adding RAM to your system (aim for 8 megabytes or more, especially if you're using System 7). And even though most PIMs don't make heavy demands on hard drive space, expect at least a couple of megabytes for the software and data files, more if the PIM requires HyperCard.

MW EDITORS' CHOICE

TouchBase/DateBook Although not as well integrated as some of the other PIMs reviewed, TouchBase and DateBook combine good performance with a well-defined interface. **Company:** After Hours Software. **List price:** $169.95 for TouchBase-DateBook bundle.

Down the Line

TO SOME PEOPLE, THE IDEAL PIM WAS PORTRAYED in Apple's Knowledge Navigator video of a few years ago. In that scenario, a fresh-faced "agent" named Phil on the desktop of a notebook-size computer played secretary to a busy college professor, taking phone calls, arranging meetings, and being generally helpful. Although I found Phil a bit hard to take, the video provided an intriguing glimpse at one possible form PIMs might take in five or ten years.

For the time being, though, even the best PIMs can't take the place of a competent secretary. All of the PIMs I evaluated were lacking in some areas, but the TouchBase/DateBook duo came closest to filling my needs. My schedule hasn't become any less busy since I started using a PIM, but I now have a fighting chance at keeping one step ahead of the chaos. m

FRANKLIN N. TESSLER, a radiologist who is struggling to keep his life organized, is a *Macworld* contributing editor.

Events and To-Dos	Pop-Up Alarms*	Output	Comments
Phone calls, meetings, and to-dos only.	no	Flexible report options through mail-merge feature.	Events must be linked to contacts.Includes full-function word processor and link to GeoQuery.Poorly organized manual.
Events can be scheduled graphically.	yes	Multiple customized reports Optional link to Sharp Wizard.	HyperCard-based.
Easy to use. No support for open-ended events.	Can set to ring at given time or interval before event.	Multiple options, easy to customize. Can opt to print business days only.	Excellent interface. Limited data sharing with TouchBase requires System 7.
NA	NA	Multiple options, easy to customize Can print Day Runner or Filofax format. Outputs to Sharp Wizard.	Fast. Limited data sharing with DateBook requires System 7.
Very flexible, but interface can be difficult to learn.	yes	Can print Filofax, Franklin Planner, and other popular planner formats. Easy to customize.	Powerful, but takes time to master. Good choice for use with PowerBooks.
Events can be scheduled graphically.	yes	Includes up to 7 predefined print formats.	HyperCard-based.
Event scheduling awkward.	no	Easy to customize reports. Includes built-in word processor with mail merge capabilities. Can print Day Runner or Filofax format.	HyperCard-based.
No direct support for recurring events.	no	Supports Sharp Wizard.	Networked version supports multiple users and includes E-mail.
Six predefined event types. No direct support for recurring events.	no	Can print any view. Includes mail merge feature.	Fast and very easy to use, but less flexible than others. Good choice for use with PowerBooks.

A guide to the best tools for diagnosing

MICK WIGGINS

and solving network problems

NETWORK UTILITIES

by Shelly Brisbin

It's 1:15 on a Friday. As you return from lunch, a frantic, frustrated marketing manager meets you at your office door. "I have a brochure that has to go out to the West Coast today," he explains, "but I can't get it to print. What's wrong?"

"Are you trying to use the color printer upstairs?" you ask calmly. He says yes.

"OK, I think I know what the problem is," you say, reassuringly. You turn to your Mac while the marketing manager peers nervously over your shoulder. After a few minutes, you've solved the problem. "Go try it again," you say.

The marketing manager looks relieved but still confused. An hour later, he's back in your office, having printed and mailed the urgent document. "How did you do it?" he wonders.

"Simple," you respond. First, you knew the network router was down even before you returned to the office because your pocket pager sounded an alarm as you drove back from lunch. Then, you simply reset the router and confirmed that it was back online. Voilà!, another network emergency defused, thanks to that invaluable genre of software applications, the network-management utility.

Each step involved in handling this network crisis *du jour*—including the call to your pager—was accomplished using network-management and diagnostic utilities. Equipped with the proper software tools, you can learn which devices are running on a network; check whether the devices are communicating properly throughout the network; find out which software packages, graphics boards, SCSI devices, and monitors are installed on the computers linked by the network; and see which version of the operating system a particular Mac is using, among other things. In short, these utilities can help ensure your status as the company's official Network God or Goddess, and in this economic climate, who couldn't use a little extra job security?

Making a List

YOUR FIRST TASK AS A NETWORK MANAGER is to get a precise picture of what's on the network. To help you accomplish this, most management utilities include a simple list function. Open the application, or initiate a network scan, and you get a list of all devices connected to the network.

A list typically includes a network device's name and type, address (network number, node number, and socket number), and zone (usually a department within a company). A node is any addressable network device—a Mac, a printer, a file server. A socket is any addressable entity in a node that corresponds to software applications and that interacts with the network, such as electronic mail, a shared database, or a remote backup application. Each socket has its own number, which is its network *address*.

The end result is that network-management (and diagnostic) software with a listing feature gives you a detailed inventory of the computer equipment on a network and many of the applications running on each device.

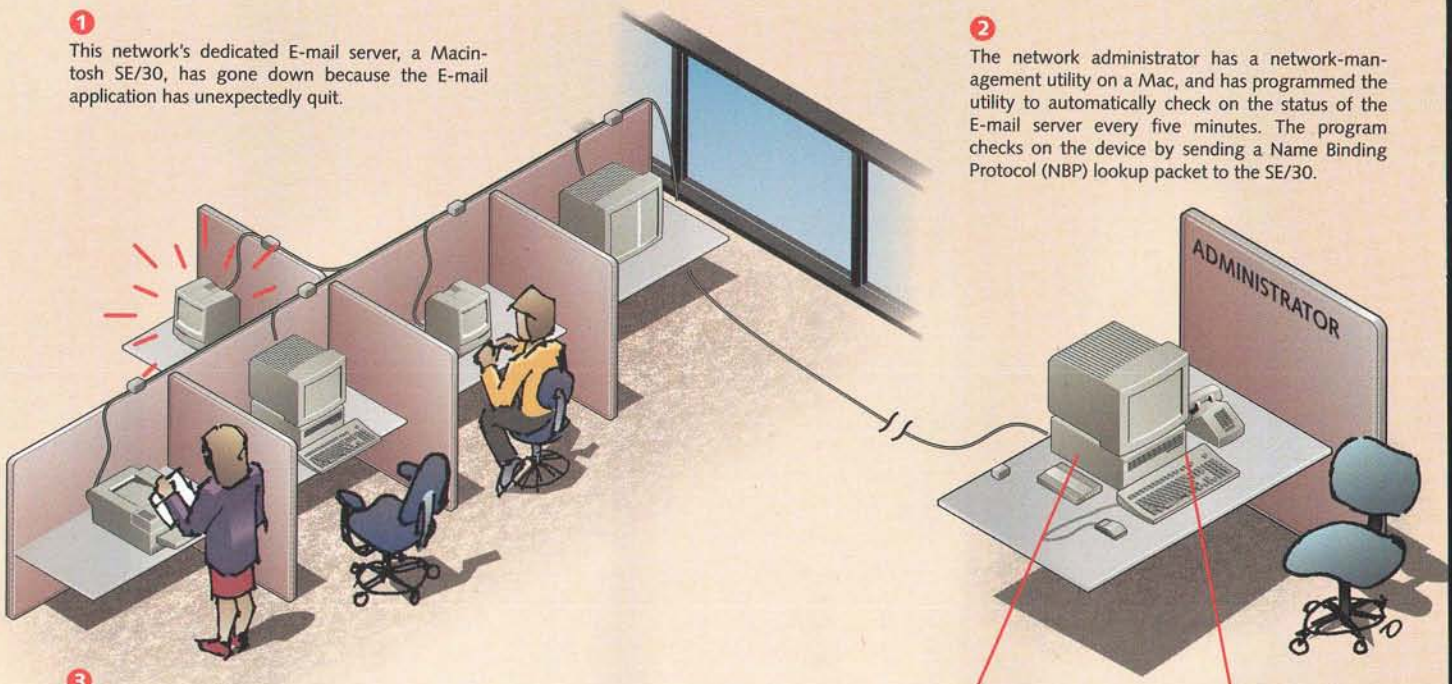
Generally, lists can be sorted by device, address, and zone. For example, you can compile a list of all the printers on a network. You can view a list on screen, print it, or export it to a spreadsheet or database; by saving the printed lists, you get a written history of the network devices.

A few network-management packages—some in the form of a desk accessory—specialize in listing. Typically, the specialized software automatically updates lists by performing dynamic network scans as devices come and go on the network; by contrast, many full-fledged network-man-

How a Network Utility Talks to a Pocket Pager

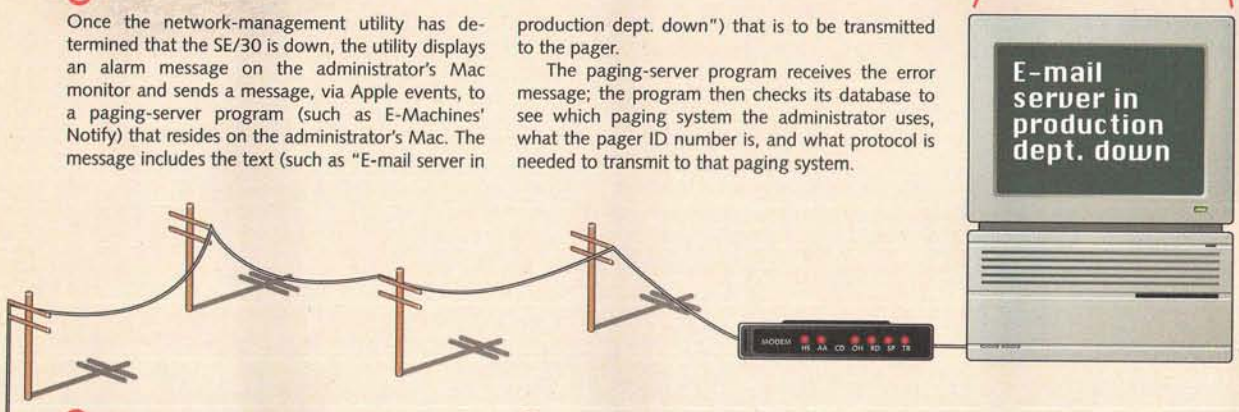
1 This network's dedicated E-mail server, a Macintosh SE/30, has gone down because the E-mail application has unexpectedly quit.

2 The network administrator has a network-management utility on a Mac, and has programmed the utility to automatically check on the status of the E-mail server every five minutes. The program checks on the device by sending a Name Binding Protocol (NBP) lookup packet to the SE/30.



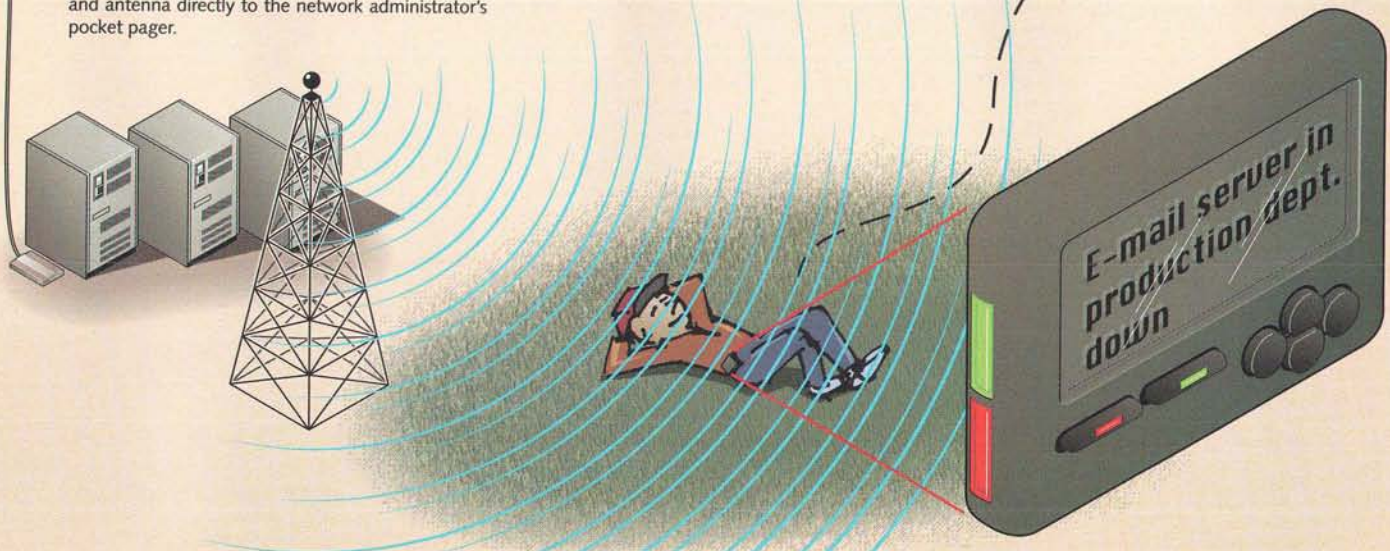
3 Once the network-management utility has determined that the SE/30 is down, the utility displays an alarm message on the administrator's Mac monitor and sends a message, via Apple events, to a paging-server program (such as E-Machines' Notify) that resides on the administrator's Mac. The message includes the text (such as "E-mail server in production dept. down") that is to be transmitted to the pager.

The paging-server program receives the error message; the program then checks its database to see which paging system the administrator uses, what the pager ID number is, and what protocol is needed to transmit to that paging system.



4 The paging-server program uploads the error message (using a modem and telephone lines) to the paging service's host computer (usually a mainframe). The paging service's computer receives the message and broadcasts it via a radio transmitter and antenna directly to the network administrator's pocket pager.

5 The service transmits 7-bit ASCII text to the pager. The text message appears on the screen of the LCD pocket pager carried by the network administrator, who must cut short the afternoon's stress-management session.



Don't **assume** everything is hunky-dory with a node just because it shows up on a list

agement packages with a listing feature must rescan the network for each update. Dedicated listers, priced at around $150, cost less than full-featured network-management packages with a listing feature (about $300 and up).

For simplicity, convenience, and affordability, your best bet is the venerable PhoneNet CheckNet, a device-listing DA from Farallon Computing. CheckNet is easy to use, generates dynamic network lists, provides a wealth of display and sorting options, and costs only $95.

If you simply need to keep tabs on how the Macs and other devices on a network are configured (system version, RAM and hard drive capacities, for example), and you don't need to track network addresses or do live scans, try TechWorks' GraceLAN Network Manager. The dynamic scan is missing, but an elegant display tells you almost everything you need to know about the configuration of networked Macs. For each Mac the display, which is useful and easily reconfigured, includes such information as the amount of RAM installed and System, Finder, MultiFinder, LaserWriter driver, AppleTalk, and EtherTalk versions, among other things.

Testing, Testing

DON'T ASSUME THAT EVERYTHING IS hunky-dory with a node just because it shows up on a list; a list doesn't tell you how a device is performing.

A node's performance can be impaired by heavy traffic, excessively long cable-wires, improper routing, and a host of other bedevilments. To determine the existence of a problem and its source, you need software that offers device testing.

Several utilities allow you to perform *echo tests*. You send information to a network device from your computer in the form of a network packet. (A packet is a package of data that can be easily traced as it travels across a network.) The software then tells you how long it took the packet to travel to and from the problem computer, printer, or other device (hence the term *echo*). If a packet takes longer than normal to reach the device, contains invalid information, or doesn't make it back at all, you've found a problem.

Inter Poll Network Administrator's Utility, a diagnostic tool from Apple Computer, lets you send echo packets to specified computers, and it provides statistics on individual and average response times. Inter Poll also provides some configuration information and includes a separate test for printers, which don't respond to echo packets (printers don't use the network protocol that's required to produce echo packets).

Inter Poll doesn't monitor your network or tell you when problems arise, but it points you toward the culprit. The product's greatest strengths are its variety of options and attractive price ($129). Learning how to use it effectively may require a look at the manual, but the effort is well worth it.

Alarming News

ANOTHER WAY TO KEEP YOUR FINGER ON a network's pulse is by having your computer let you know—via an audible or visible alarm—when something's amiss. Alarm functions offer various notification options: all network-management tools send a screen message or a sound to the administrator's Mac; most, including AG Group's Net Watchman and Caravelle's NetWorks, notify a pocket pager (see "How a Network Utility Talks to a Pocket Pager"), and one—NetWorks—sends an E-mail message.

Alarm software tells you which devices are up or down and allows you to prioritize notifications by individual node or class of device—Mac Plus, LaserWriter, file server, and others. Given a large network, you might find it useful to limit your alarm requests to file servers, printers, or routers. And if you want additional job security, place a higher priority on your boss's laser printer, making sure you're notified whenever trouble brews.

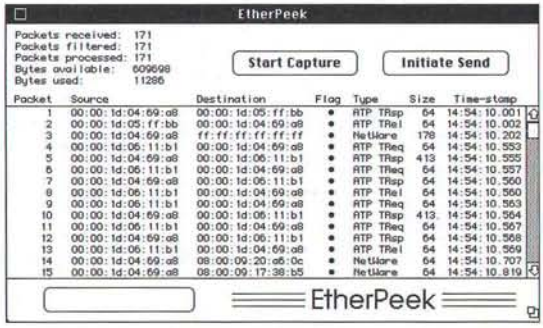
NetWorks is the best alarm package available—it offers the largest array of alarm functions, sits comfortably in the background (it uses only 500K of RAM), is extremely flexible, and features a colorful graphical display.

Drawing the Lines

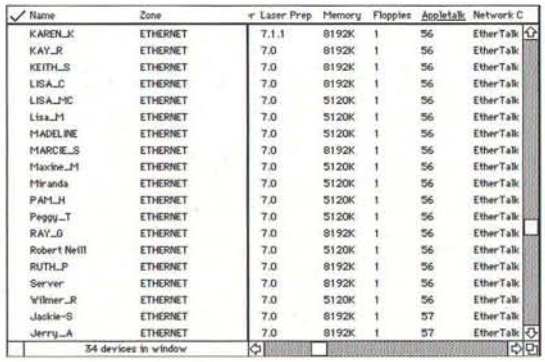
EVERY BOOK ON NETWORKING—and almost every magazine article—advises administrators to make a map of the devices and wiring associated with their internet. (An internet is a collection of two or more networks, connected by routers and accessible by all users on each network.) Good advice, but such maps quickly become outdated unless maintained religiously.

Network-mapping utilities offer the ability to produce iconic representations of a network's nodes. Mac nodes look like Macs—most mapping packages can distinguish a compact Mac from a modular Mac—routers look like routers, and so on. Non-Mac network devices such as Novell file servers are represented by icons as well. Network diagrams also identify cable segments that lie between all devices.

In addition, a *logical* network map enables you to show network structures in a form more easily grasped by those who aren't network know-it-alls. A logical network map displays the network structure;



Packet Patrol In the main window of EtherPeek, AG Group's protocol analyzer utility is capturing the destination, type, size, and time-stamp information for every packet traveling across a network. EtherPeek can also be configured to capture and analyze only the network packets that are of immediate interest.



Who's Got What TechWorks' GraceLAN Network Manager provides configuration data for all devices on a network in a display that you can easily reconfigure. This window has been sorted to display information, such as operating-system version and computer RAM size, about all Macs on a network.

a network *topology editor*, on the other hand, indicates the actual location of a device or wiring segment.

CSG Technologies' Network SuperVisor is my pick among network mapping utilities. SuperVisor makes life as a network manager a great deal less painful because it lets you integrate mapping with network lists, alarms, and device filtering (selecting nodes to be mapped based on type or address) and because it gives you complete control over how a network diagram is drawn.

Traffic Control

JUST LIKE A CITY STREET, A NETWORK can bear only a certain amount of traffic; that amount depends on the *bandwidth*—the width, efficiency, and capacity of the network pipeline. Knowing how much bandwidth your network has, and how much of it is available given the size of your internet, can simplify the process of planning and allocating network resources.

You can keep an eye on available bandwidth with a graphically oriented network-traffic analyzer. This type of software acts as a voyeur, watching every packet as it goes back and forth between nodes. A network analyzer reports the number and type of packets and displays this information on the network manager's screen, often in graphical form. You can export packet information to spreadsheets for further analysis. A network analyzer also tracks errors—for example, when a packet is prevented from reaching its destination.

If you experience repeated problems with printing or other communications, you can use a network analyzer to isolate data collisions and other errors that are likely to be the cause. Should insufficient bandwidth be the problem, you may learn enough from your analysis to make decisions about shortening network cables or moving problem devices to the quieter side of a router or bridge.

Farallon's TrafficWatch II is the most complete network analyzer that I tested. It tracks each packet's source and destination, as well as glitches that occur during transfer. The display is graphical, and information can be exported to a Microsoft Excel macro (which comes with the program). You can export TrafficWatch data to the macro, then create charts that display each device's activity and error patterns.

TrafficWatch doesn't support all types of Ethernet network adapter boards, however. Farallon says TrafficWatch supports boards that—like its own products—are based on a National Semiconductor chip. The Cabletron E6119 network board I used in my tests wasn't supported by TrafficWatch. A call to Farallon's technical-support line yielded an offer to sell me a Farallon Ethernet board for $100 (compared with the normal $200-to-$300 price of such an adapter), rather than a solution to the incompatibility problem.

Packets and Protocols

A SIMPLE COUNT OF PACKETS ISN'T always enough to tell you what's happening on the network. That's when a *protocol analyzer*, also called a packet analyzer, comes in handy (a protocol defines rules and procedures for transmitting information).

A software protocol-analyzer captures the complete contents and attributes of each packet. It tells you which network protocol is associated with each packet, as well as the source and destination information. It generally allows you to specify

NETWORK UTILITIES AT A GLANCE [1]

Company	Product Name	Price [2]	Lists Devices	Tests Devices	Provides Alarms	Contacts Pager	Generates Maps	Analyzes Traffic
AG Group	EtherPeek	$795	○	●	●	●	○	●
	LocalPeek	$495	○	●	●	●	○	●
	TokenPeek	$995	○	●	●	●	○	●
	Net Watchman	$295	●	○	●	●	●	○
Apple Computer	Inter Poll Network Administrator's Utility	$129	●	●	○	○	○	○
Caravelle Networks Corporation	NetWorks	$295	●	●	●	●	○	○
CSG Technologies	Network SuperVisor	$495	●	○	●	○	●	○
	Network SuperVisor Jr.	$145	●	○	○	○	○	○
	Network SuperVisor TE	$295	●	○	●	●	●	○
Dartmouth College	MacPing	$69	●	●	○	○	○	○
Dayna Communications	Network Vital Signs	$449	●	○	●	●	●	●
Distributed Technologies	TalkManage	$695	●	●	●	○	●	○
	TalkSpy/TalkStat	$395	○	○	○	○	○	●
Farallon Computing	NetAtlas	$695	●	●	○	○	●	○
	PhoneNet CheckNet	$95	●	○	○	○	○	○
	TrafficWatch II	$695	●	○	○	○	○	●
MacVonk USA	NetOctopus	$645	●	○	○	○	○	○
Neon Software	NetMinder LocalTalk	$395	○	○	●	○	○	●
	NetMinder EtherTalk	$595	○	○	●	○	○	●
	RouterCheck	$895	●	●	●	●	○	○
On Technology	Status Mac	$749	●	○	○	○	○	○
SoftWriters	VersionTerritory	$199	●	●	○	○	○	○
Sonic Systems	Radar	$499	●	○	●	○	●	○
TechWorks	GraceLAN Asset Manager	$895	○	○	○	○	○	○
	GraceLAN Network Manager	$495	●	●	○	○	●	○
	GraceLAN Update Manager	$295	○	○	○	○	○	○
	Network Utilities	$129	●	●	●	○	○	○
Trik	NetDistributor Pro	$695	○	○	○	○	○	○

● = yes; ○ = no; NA = not available. [1]The table includes network management and diagnostic utilities only. Utilities included in this table do not require specific hardware for base configurations; the size of base configurations can vary. In most cases, site licensing is available.

Just like a **city street,** a network can bear only a certain amount of traffic

which packets will be captured and which events or protocols will trigger the capture.

This sophisticated level of analysis isn't for everyone. For one thing, you have to be able to read packet headers and identify the relationship of protocols to network-traffic patterns. Novell file servers, TCP/IP-based Unix workstations, and Mac-to-mainframe communications, for example, all use different communications protocols. Such detail is probably more than you need if your network consists of only a few types of machines.

The two leading protocol-analyzer vendors offer separate versions of their software for Ethernet and LocalTalk networks. Neon Software's NetMinder LocalTalk (and NetMinder EtherTalk) and AG Group's LocalPeek (and EtherPeek) have similar capabilities. Each captures and decodes some or all packets traveling along a network; each can be configured to begin captures when certain packets appear, or to filter out packets not currently of interest. Both programs can send packets of varying size to networked devices to ascertain the devices' status and ability to accept and transmit information without error.

Both programs stand up well against hardware protocol-analyzers, which are more expensive. The edge goes to LocalPeek and EtherPeek, which are simpler to use and full of little extras, such as the ability to graph packet activity, and a customizing function that allows you to modify any captured packet and retransmit it to the network.

Taking Stock

THE PROLIFERATION OF MAC MODELS, peripherals, and software has made it difficult to manage resources on a network. To the rescue come software utilities called *profilers*, which are designed to gather highly detailed information about the computers on a network.

A profiler enables you to update your inventory of computers, software, and peripherals; determine whether or not a machine's configuration is adequate (you might discover an older Mac II that doesn't have, but should have, an accelerator board); and even perform some minor troubleshooting.

Typically, a profiler offers details about the kind of Mac (SE/30, IIsi, Quadra, and so on); the System and Finder versions, printer driver, and AppleTalk versions installed; the number and type of video boards, SCSI devices, and monitors attached; the names and versions of applications and system extensions present and/or running; the amount of RAM installed; and much more. By comparison, a utility with a listing feature, as mentioned earlier, provides details only on a network device's name and type, address, and zone.

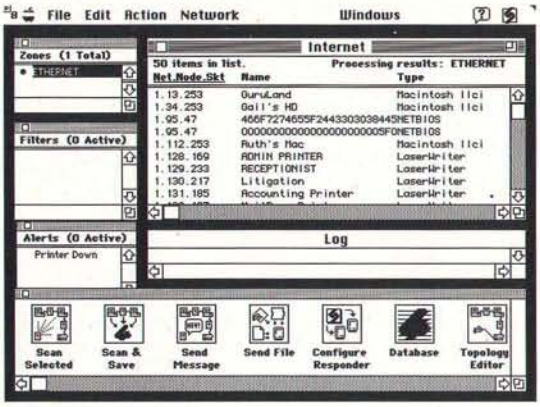
NetOctopus, an all-in-one network-management package from MacVonk USA, digs deeper than most profilers, offering such details as the size of a Mac's system heap (the amount of memory set aside for the operating system) and the amount of parameter RAM (a section of memory that keeps track of the Mac's clock settings and what devices are connected to the Mac's serial ports).

But GraceLAN Network Manager, from TechWorks, is the best among general-purpose analyzers. Because of its low overhead—it requires only 1MB of RAM, while others typically need at least 2.5MB to 3MB—the program can retrieve a vast amount of information at an acceptable speed. GraceLAN Network Manager has a useful on-screen viewing format, providing its configuration information in a scrollable display that can be sorted by any visible parameter; a menu choice brings forth an individual display for each Mac.

In addition, GraceLAN Network Manager works smoothly with GraceLAN Asset Manager, a stand-alone database built on ACIUS's 4th Dimension. The value of network inventory data depends, naturally, on your ability to use it in meaningful ways, and GraceLAN Asset Manager's inclusion of fields for supplies, accessories, software, and catalogs of common Mac hardware makes it a full-featured winner among network profiler databases.

Analyzes Protocols	Generates Reports	Provides Mac Profiles	Updates Software Remotely	Toll-Free Phone	Toll Phone
●	●	○	○	800/466-2447	510/937-7900
●	●	○	○		
●	●	○	○		
○	●	●	○		
○	●	○	○	800/776-2333	408/996-1010
○	●	○	○	800/363-5292	613/596-2802
○	●	●	○	800/366-4622	412/471-7170
○	○	●	○		
○	○	○	○		
○	●	●	○	NA	603/646-2643
○	●	○	○	NA	801/531-0600
○	●	○	○	800/285-4988	617/684-0060
●	●	○	○		
○	●	●	○	NA	510/596-9000
○	○	●	○		
●	●	●	○		
○	●	●	●	NA	215/660-0606
●	●	○	○	NA	510/283-9771
●	●	○	○		
○	●	○	○		
○	●	●	●	800/548-8871	617/876-0900
○	●	○	○	NA	512/263-4062
○	●	●	●	800/535-0725	408/736-1900
○	●	○	○	800/688-7466	512/794-8533
○	●	●	○		
○	●	○	●		
○	●	○	○		
○	●	●	●	800/466-8745	617/933-8810

products in order to work. Several individual network utilities are available as product bundles. [2] *Prices listed are*



Mapping and More Network SuperVisor—CSG Technologies' network-mapping utility—enables you to keep an eye on the network map (shown in the Internet window, above right) or to click on any icon at the bottom of the window to launch a network scan, view a topology map, open the database, and more.

Staying Current

INCREASINGLY, SOFTWARE PROGRAMS are including a greater number of features with each revision, making the programs larger and therefore more difficult to install (Microsoft Word is a good example). That's bad news when your job is to keep everyone on a network supplied with up-to-date software revisions.

Remote software-updating utilities let you create a package of software for delivery to any or all workstations. Any updater can send software to a user's System Folder, a predetermined application folder, or a location of the user's choice. If the file already exists on the designated computer, the updater can be instructed to replace the file or to put it in another location.

The simplest update programs, including On Technology's Status Mac and Sonic Systems' Radar, deliver a file—an application program, for example—to networked Macs. If the file already exists on the designated computer, the updater can be instructed to replace it or to put the file in another location. Update packages are also usually smart enough to determine where a system extension or control panel belongs.

Most commercial applications come with a variety of auxiliary files. For this reason, many manufacturers use Apple's Installer program to automate the software loading process. Only one software updater, the versatile NetOctopus, can use the Installer scripts to duplicate the process on the network. That's helpful, because complex installations often require that files be placed in several locations on a user's hard drive—the Extensions folder, the Preferences folder, an applications folder—making the job of creating an update package time-consuming.

Another interesting entrant in this category is Trik's NetDistributor—the only package capable of installing fonts and desk accessories directly into a designated Mac's System file. The easy-to-use package employs a combination of icon-rich scripts and useful plug-in modules to accomplish the task.

Should You Buy a Bundle?

SEVERAL VENDORS BUNDLE their most popular network-management packages—in some cases this is a good deal, but you should be careful not to buy more than you need.

For example, AG Group's LocalPeek, EtherPeek, and Net Watchman are sold separately at $495, $795, and $295, respectively. AG's Net Patrol Pack 1 bundle, which combines the three, costs $1395. That's a fairly high price to pay, and the savings ($190) isn't terribly significant; but if you're certain you can use all three utilities, then why not save $200?

Farallon's bundle, PhoneNet Managers' Pack, is relatively expensive ($995), too, but it's the most complete package available. The bundle includes TrafficWatch II, NetAtlas, PhoneNet CheckNet, two copies of the Timbuktu screen-sharing software, the StarCommand hub-management utility, and ten copies of Dantz Development's Retrospect Remote, a backup package.

Selecting Features

BUNDLING ISSUES ASIDE, MOST NETWORK utilities perform more than one function, though not always equally well (see "Network Utilities at a Glance"). The challenge, then, is to find the package that offers just the features you need.

If your network is large and diverse—with hundreds of nodes and routers and several computer platforms—you're usually better off investing in a variety of software utilities or desk accessories that focus primarily on a few functions. Hand-picking network software can become expensive, but more often than not, utilities that are dedicated to certain tasks give you a higher level of control and information than the all-in-one programs. If you go this route, try to buy as many utilities from the same vendor, as they're more likely to work together smoothly.

Managers with smaller, more Mac-centered networks of less than 100 nodes should consider full-featured packages, such as MacVonk USA's NetOctopus, the jack-of-all-trades network package. Although the functions might not be as complete as those offered by dedicated applications, in the long run these programs can offer the better value for the small network.

Coming Up

INCREASINGLY, NETWORK ADMINISTRATORS are finding themselves responsible for a variety of computer platforms, spread out over an ever-expanding internet. With that in mind, Apple is supporting a growing set of multivendor standards; chief among them is SNMP (Simple Network Management Protocol).

SNMP is a software protocol designed for open network management and is now widely used for TCP/IP networks. Networked devices that support SNMP employ an agent, a piece of software that provides network-configuration information to the network manager. This means you'll be able to manage routers, bridges, file servers, Macs, PCs, Unix workstations, and other networked nodes from one network-management workstation. While this is currently possible through sets of proprietary management tools, SNMP's emphasis is on open network management.

SNMP promises to deliver a whole new level of management to the Mac-based administrator. But at this writing, SNMP is in its infancy in the Macintosh arena. A few router vendors currently support SNMP, and many others are expected to follow suit in the coming months. Apple has promised to deliver SNMP-compatible products in 1993, but details haven't been made available. Once the hardware is in place, you should start to see SNMP-compatible software utilities on the shelves as well.

All of this means that your job as a network administrator should become easier this year. You'll still have to deal with the frustrated marketing managers who can't print their color brochures at the last minute—but that's what job security is all about. m

SHELLY BRISBIN is a writer based in the San Francisco Bay Area.

MW EDITORS' CHOICE

Network Diagnostics

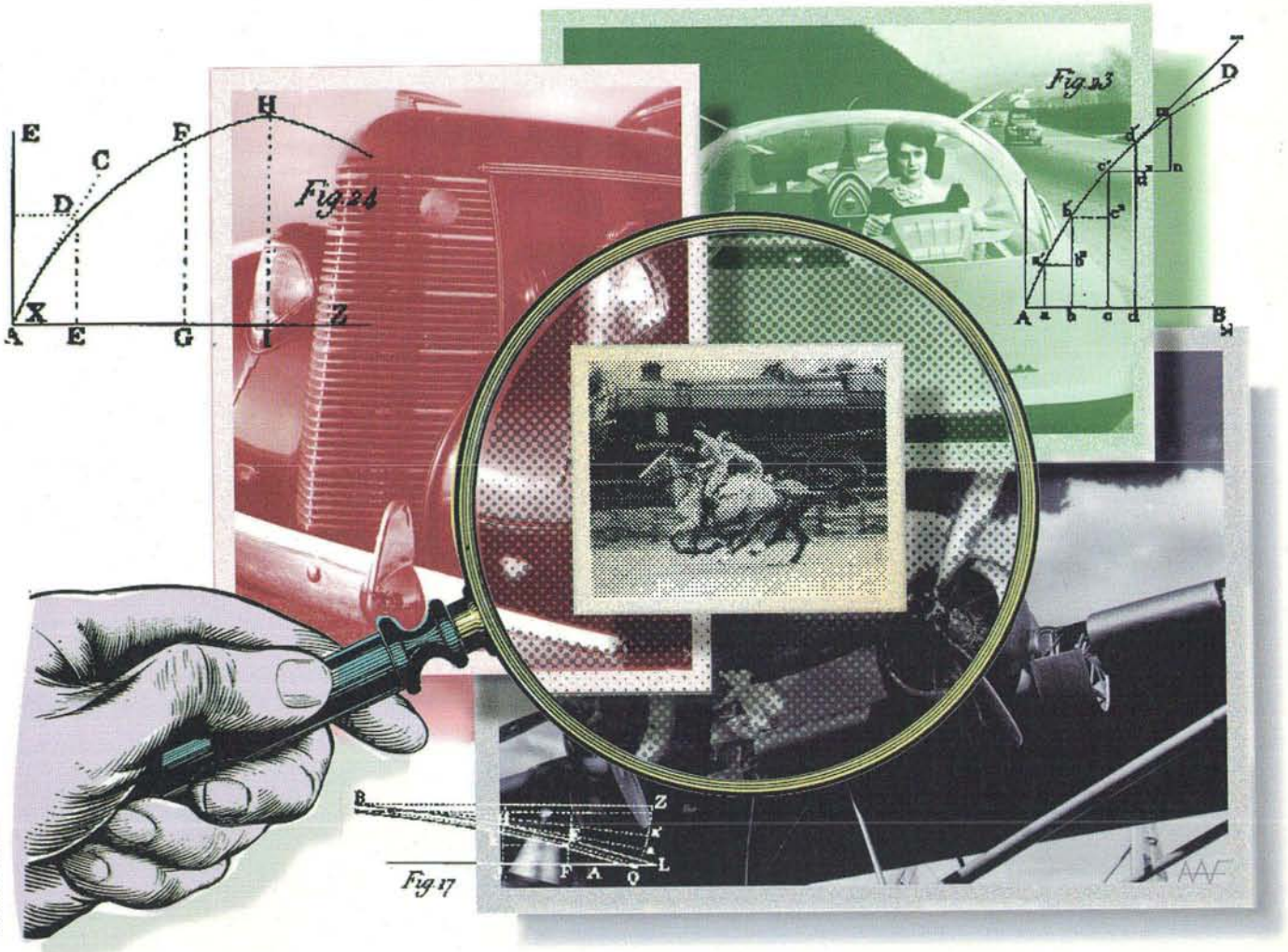
LocalPeek and EtherPeek These packet analyzers are robust, full-featured, and easy to use, despite the complexity of their functions. **Company:** AG Group. **List prices:** $495 and $795, respectively.

Network Management

Network SuperVisor This smooth, integrated database and network-management package can be slow, but makes up for it with elegance and versatility. **Company:** CSG Technologies. **List price:** $495.

HALFTONES DEMYSTIFIED

HOW TO GET THE BEST TINTS AND HALFTONES ON THE MAC



ANDREW FAULKNER

BY STEVE ROTH

PEOPLE OFTEN SAY THAT THE WORLD WOULD BE A PRETTY BORING PLACE WITHOUT COLOR. BUT IMAGINE IF THERE WEREN'T EVEN ANY GRAY—IF EVERYTHING WERE JUST BLACK OR WHITE. THAT'S WHERE WE'D BE IN THE WORLD OF PRINTING PRESSES, LASER PRINTERS, AND IMAGESETTERS IF WE DIDN'T HAVE *HALFTONING*, THE

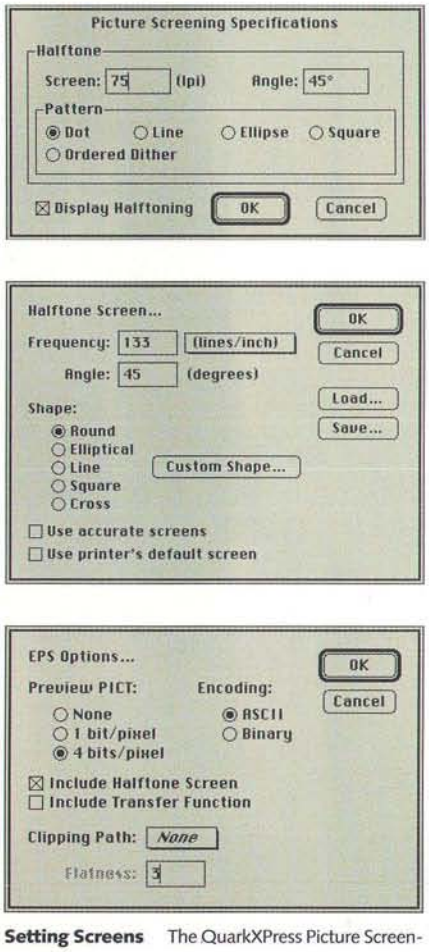
photographic or digital procedure for breaking up gray images into patterns of black spots that fool the eye into seeing gray. Halftoning is the heart and soul of the printing process.

Let's start by clearing up a common misconception (I'll address several in this article). Halftoning is not just for photographs. Any time you print gray on a page—a gray box or tinted type, for instance—you're using halftoning. It's essential, because printing presses, laser printers, and imagesetters can't print gray—just black. So how can black ink (or toner) give the impression of gray?

Photographic Halftoning

BY SCREENING AN IMAGE—PHOTOGRAPHING IT through a ruled sheet of glass or plastic—photographic halftoning breaks the image into a pattern of spots (see "Halftoning: Key to Gray-Scale Printing"). Take a close look at any photograph or tint printed in a newspaper or this magazine, and you can see those spots.

Now it's time to obliterate another common misconception. With halftoning, the spacing of the spots doesn't change; they are not bunched more tightly in dark areas, as you might think. Size is what counts. The spots are smaller in light areas, and larger in dark areas (to the point of overlapping in black areas). The spacing of the spots is called the *screen frequency*.



Setting Screens The QuarkXPress Picture Screening Specifications dialog box (top) offers screening options for imported bitmaps. PageMaker provides similar options. Photoshop's Halftone Screen dialog box (middle) gives full control over the screen settings used to print an image. When you save an EPS file from Photoshop (bottom), you may include those screening instructions in the file.

In addition to screen frequency, halftones have two other controllable parameters—*screen angle* and *spot shape* (see "Special Effects Using Spot Shape"). You adjust these parameters based on your image, your output method (laser printer or imagesetter), and your printing method (laser printer, photocopier, or offset printer). Screen frequency indicates how many spots there are per inch. It's specified, somewhat confusingly, in lines per inch (lpi) or "lines," because halftone screens are made up of lines (rows) of spots.

Screen angle specifies the orientation of those rows of spots on the printed page. People generally use a 45-degree screen angle for halftones to make the halftone pattern least apparent. Other angles are useful for color printing and special-effects screening.

Spot shape is the shape of the halftone spots. They're often round, but they can be elliptical, square, or—for special effects—triangular or forming a line. See "Special Effects Using Spot Shape" for examples of special-effects screening.

Digital Halftoning

IT'S EASY TO MAKE HALFTONE SPOTS LARGER AND smaller with photographic halftoning, light being such a malleable medium. (The shape and spread of light beams vary according to the screen used.) But what do you do when you get to the digital world, with its rigid approach to things? You can't make laser printer and imagesetter dots larger and smaller; they're always the same size (though some of the new laser technologies—such as Apple's PhotoGrade—adjust laser dot sizes to give the appearance of high screen frequencies). The solution is to use a bunch of dots to make a halftone spot (see "Digital Halftoning"). By turning dots on, you make the halftone spot bigger; you're increasing the *tint percentage* for that area. Turn all the dots on, and you've got a 100 percent tint. Turn half of them on, a 50 percent tint. And so on.

The more dots within a halftone spot, the more possible gray levels it can represent. A spot that contains 4 dots has 5 possible gray levels (including white and black): no dots on, 1 dot on, 2 dots on, 3 dots on, and all 4 dots on.

Now let's get into a little arithmetic. (Math phobes take heart: you're reading the words of a man with a degree in theory of literature—no math background, no computer science. If you can multiply and divide—or have a calculator—you know all the math you need to master halftones. And if you find the terminology of scanning and halftoning confusing, take a look at "Dots versus Spots: A Glossary.") Imagine you're working with a 300-dpi laser printer. Its default screen frequency is 60 lpi—that means there are 60 halftone cells per inch. Since there are 300 dots per inch, and each halftone cell is 1/60 inch on each side, each halftone cell contains 25 laser dots (in a 5 by 5 square).

The obvious conclusion: On a 300-dpi laser printer, printing with a 60-line screen, there are 26 possible gray levels (there are 25 dots to turn on and off). Having only 26 gray levels to work with results in noticeable *posterization*—stairstepping from one gray level to another, as opposed to a smooth gradient.

Now imagine using a 50-line screen instead. Since there are 50 spots per inch, and 300 dots per inch, each spot contains 36 dots (6 dots on each side). It's a coarser-looking image because the halftone spots are bigger, but you get more gray levels—less posterization. This little exercise in arithmetic points out the essential trade-off of digital halftoning: at a given resolution, when you increase the screen frequency, you reduce the number of possible gray levels (see "Digital Quality Trade-Offs"). Here's the formula for figuring out the relationship between gray levels, screen frequency, and resolution:

$$\left(\frac{\text{output resolution}}{\text{screen frequency}}\right)^2 + 1 = \text{possible gray levels}$$

The following table gives several examples of this formula in action.

Resolution	Screen Frequency	Gray Levels
300 dpi	100 lpi	10
600 dpi	75 lpi	65
1200 dpi	100 lpi	145
1200 dpi	150 lpi	65
2400 dpi	120 lpi	401

Halftoning: Key to Gray-Scale Printing

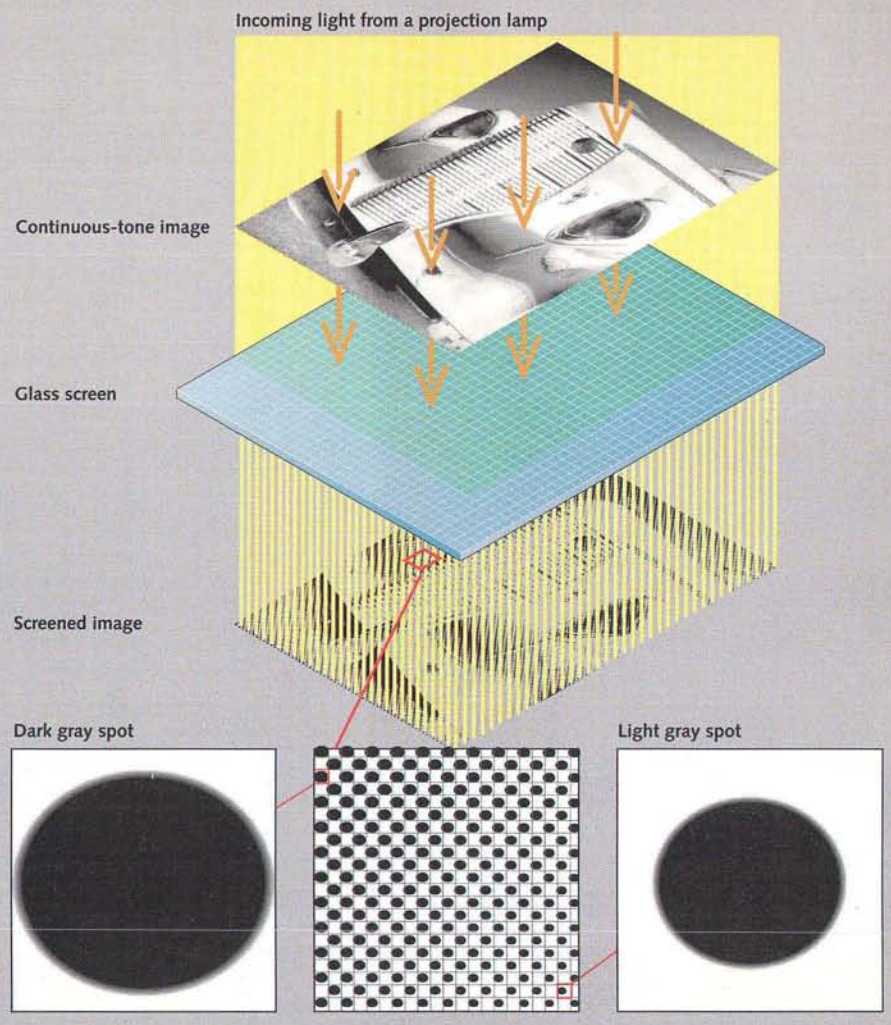
To print a continuous-tone image (for example, from a photographic negative), you must break the image into tiny spots. These spots vary in size and shape and are arranged in a grid. When viewed from normal reading distance, the spots in the printed image simulate the various gray shades in the original image.

Photographic Halftoning

Screening an Image
In conventional halftoning, you project light through a continuous-tone film image. Depending on the opacity of the various areas of the image, different amounts of light pass through the film and hit a screen (usually a plate of glass with a grid etched into it). Each square in the grid focuses light onto an area on another piece of film below. The density of the grid is measured in lines per inch and determines the frequency of the halftone screen. Newspapers use very coarse screens, around 85 lpi; some magazines use screens up to 300 lpi for high-quality printing.

Screened Film Image
Spots on the screened film vary in size according to the amount of light that passes through the screen. Intense light passing through a relatively transparent part of an image creates a large spot. Subdued light, from nearly opaque sections of an image, creates a small spot. In this way a replica of the original image is formed.

Up close, conventional halftone spots are smooth and uniform in shape. Spot size can vary almost infinitely, limited only by the grain of the film receiving the light.

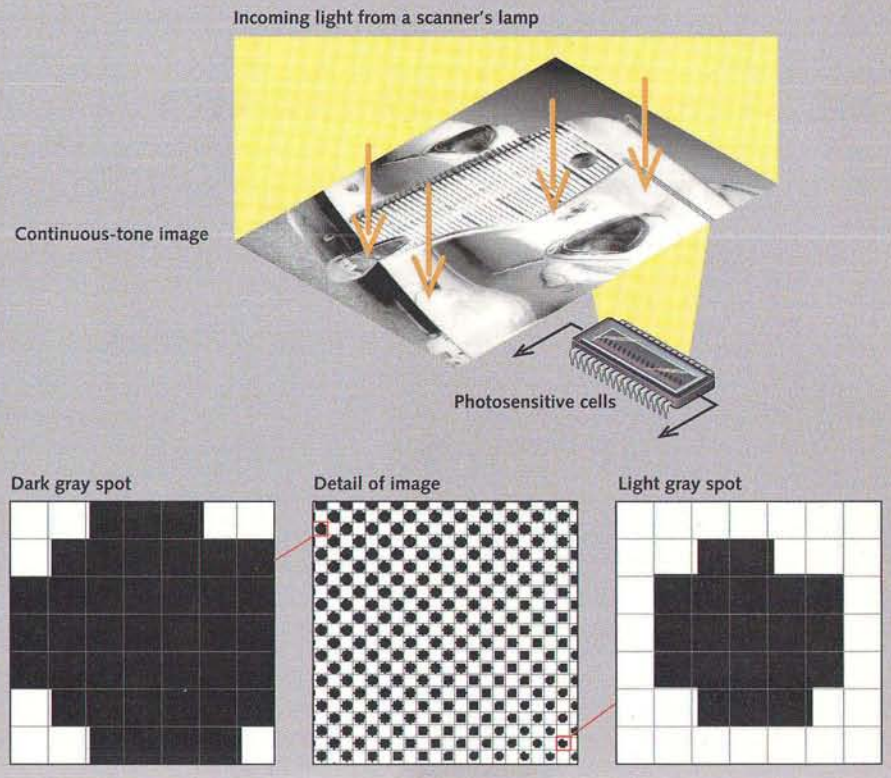


Digital Halftoning

Scanning an Image
As with photographic halftoning, digital halftones begin with a continuous-tone image. But in this case, light is passed through (or bounced off of) the image using a scanner instead of a screen. For digital halftoning, photosensitive cells measure the varying intensities of light passing through (or reflecting off of) the image. Each cell converts the light energy to an electric charge commensurate to the amount of light that hits the cell. Each signal is then converted to a gray value.

Activating the Dots
The output device groups black dots into halftone spots to create the halftone from a scanned image. The PostScript interpreter in the output device matches the scanned gray-scale image against the halftone grid and determines the number of dots to be turned on in each spot.

Up close, the limitations of digital halftones become apparent. Unlike the infinite variations seen in photographic spots, each digital halftone spot can vary only by how many dots there are per spot—in this case, 50 different grays are possible per spot. To get more flexibility out of the halftone spot, it must be larger—made up of more dots—thereby allowing more gray levels.



The formula and table are good guidelines, but you need one other piece of information to make them useful: the human eye can distinguish no more than 256 gray levels. So PostScript interpreters are limited to working with 256 gray levels (except PostScript Level 2, which for mysterious reasons supports more than 256). So there's no reason to strive for more than 256 gray levels. You can't print them or see them.

The Rule of 16

THAT SIMPLE FACT BRINGS US TO THE BEST TIP IN this article, which I call The Rule of 16 (it works because 16 is the square root of 256, but you don't need to know that to use the tip). This tip tells you how high the output resolution needs to be for a given screen frequency to avoid losing gray levels. You can express it in two different ways:

maximum screen frequency = output resolution ÷ 16

or (I find this one more useful):

required output resolution = screen frequency × 16

The first one is helpful if you know your output resolution (you're using a 1200-dpi imagesetter, for instance) and are trying to decide what frequency to use. The second one is useful if you know your target screen frequency. For example, your printshop says to produce a job with a screen frequency of 100 lpi, because that's what the press and paper can handle. You multiply that by 16, and start shopping for a laser parlor that has a 1600-dpi (or better) imagesetter.

Setting Screen Frequency

TELLING YOU TO TALK TO YOUR PRINTSHOP TO find out what screen frequency to use is sometimes good advice, but suppose you take your job to a local quick printer, and the counterperson (fresh out of high school) thinks screens are what you use to keep the flies out. How do you know what frequency to use? There are several interdependent factors to consider.

- **Dot Gain** Most of the problems of screen frequency revolve around *dot gain*—a slight spreading, or size increase, of the halftone spots so they start to merge. It causes halftones to clog up and look dark and muddy. Dot gain is more of a problem at higher screen frequencies, since the spots are closer together. For a table of recommended screen frequencies for different situations, see "Choosing Screen Frequency."
- **Reproduction Method** How are you going to print copies? If you're using a laser printer or photocopier, don't plan on more than about 85 lpi; at higher frequencies the halftones clog up. With offset printing, you can normally use up to a 150-line screen. Talk to your printshop for offset work.
- **Reproduction Stock** If you're printing on newsprint, anything over about 85 lpi clogs up. Uncoated stock is limited to about 120 lpi (sometimes even 100 lpi, especially with less-than-white stock). Coated stock, depending on the quality, brightness, and printing method, can hold up to 300 lpi and still look good. Many printshops have trouble handling more than 150 lpi, however, even on high-quality coated stock.
- **Output Method and Resolution** Laser printers, no matter how high their resolution, have trouble printing good-looking grays. It's the nature of toner-based devices. Plan on using a 75-line screen or lower, though you may eke out good results at up to 110 lpi with higher-resolution and enhanced-resolution laser printers. Imagesetters, since they use light to expose photographic paper or film, can produce very fine screens.
- **Output Medium** If you output to paper, even on a top-of-the-line, 3000-dpi imagesetter, you're limited to about 100 lpi. The printshop has to photograph the paper to make film in order to produce printing plates, and shooting from paper originals results in significant dot gain. If you want more than a 100-line screen, you need to output directly to film. This also brings up a tip for users of Apple's PhotoGrade and other high-res laser-printing methods: print page masters (from which plates are made) on acetate instead of on paper to reduce dot gain and therefore make the output more reproducible on press.
- **What You're Printing** If your publication contains no photographs or graduated tints, you may not need the whole gamut of 256 gray levels. In that case, consider going to a higher screen frequency even if you don't have the resolution to support it under The Rule of 16. If you use only 2 or 3 or 4 different gray levels for tints in your publication, it doesn't matter if only 24 gray levels are available.

CHOOSING SCREEN FREQUENCY

Output Resolution	Output Medium, Method	Reproduction Method	Paper Stock	Screen Frequency	Gray Levels
300	paper, laser	laser	laser paper	53	**33**
300	paper, laser	photocopier	bond	53	**33**
600	paper, laser	offset	coated	75	**65**
1000	paper, laser	laser	laser paper	100	**101**
1000	paper, laser	photocopier	bond	75	**179**
1200	photographic paper, imagesetter	**photocopier**	coated	85	200
1200	photographic paper, imagesetter	offset	coated	75	**>256**
2400	photographic paper, imagesetter	offset	**newsprint**	75–85	>256
2400	**photographic paper, imagesetter**	offset	uncoated	90–100	>256
2400	film, imagesetter	offset	coated	120–150	>256

Several factors affect the screen frequency you choose for a job. This table depicts several scenarios, with the factors that limit what screen frequency can be used highlighted in bold.

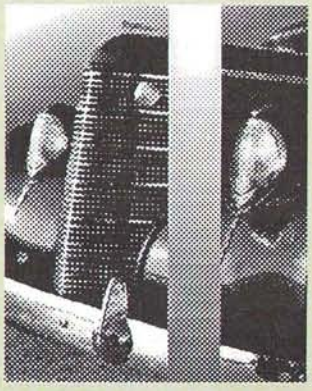
Controlling Screens in Software

SO HOW DO YOU CONTROL SCREEN FREQUENCY? IT depends what programs you're using, and in what combinations. Most desktop publishing, image-editing, and illustration programs provide means to control the halftone screens—frequency, angle, and spot shape—for the documents they produce (see "Setting Screens"). If you're using a single program and a single screen specification for the whole publication, setting the screens is pretty straightforward. But to create parts of your publication in one program and then place them on a page in another, there are some special fac-

Digital Quality Trade-Offs

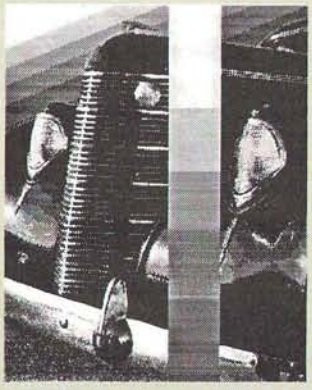
Digital halftone spots are made up of printer dots. The number of dots in each spot corresponds to the number of gray levels the spot can represent. The larger the spot, the more dots—and the more shades of gray that can be represented, at the cost of a coarser screen at a given output resolution. A finer halftone screen creates smaller spots composed of fewer dots. This may sharpen details, but reduces the number of grays that can be represented. This results in posterization, creating a stair-step effect in moving from one shade to the next.

53 lpi at 300 dpi



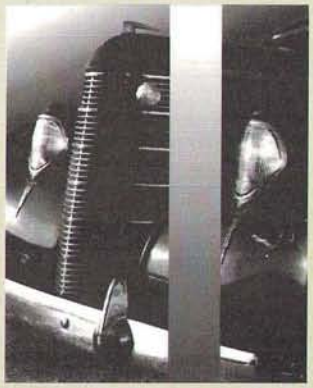
At 300 dots per inch, a 53-lines-per-inch screen yields 33 shades of gray (including white). Each halftone spot is made up of 32 printer dots. This relatively small number of gray levels is not aesthetically jarring in such a coarse image.

133 lpi at 300 dpi



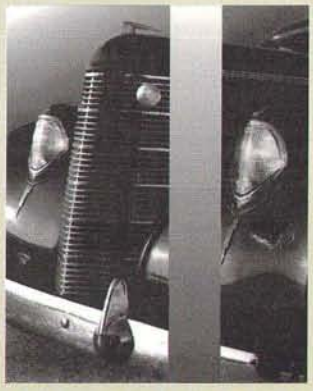
A finer halftone screen, when used on a laser printer, reduces the number of grays. Here, 300 dpi with a 133-lpi screen yields only 6 shades of gray. Although the image is more detailed, the finer screen creates abrupt shifts in shade.

150 lpi at 1200 dpi



Higher-resolution output devices, such as imagesetters, employ higher screen frequencies without sacrificing as many gray shades. Because printer dots are smaller, more dots can fit into a smaller halftone spot. At 1200 dpi with a 150-lpi screen, we get 64 shades of gray.

150 lpi at 2400 dpi



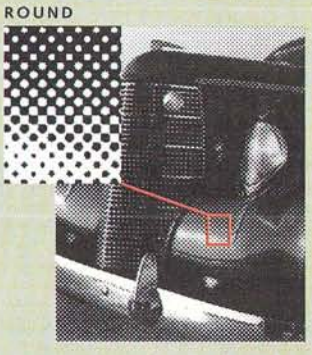
Increasing the output resolution increases the number of grays. Here, 2400 dpi at 150 lpi yields 256 shades of gray—eliminating posterization.

Special Effects Using Spot Shape

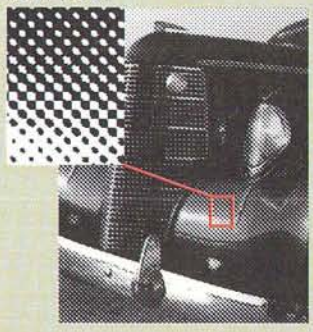
Common Halftone Screens

Below are a variety of halftone spot shapes and screen angles. At finer screen frequencies (133 lpi and up) screen differences are barely noticeable. At coarser frequencies (85 lpi and down, as shown below) the screen becomes visible, and using a different spot or angle has an obvious aesthetic effect. Screening options vary from program to program.

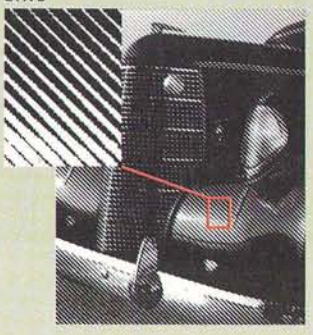
ROUND



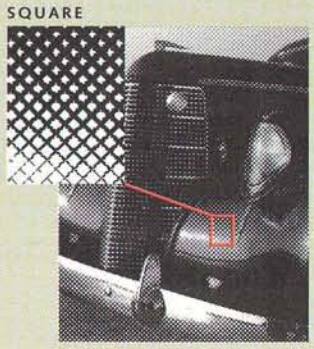
ELLIPTICAL



LINE



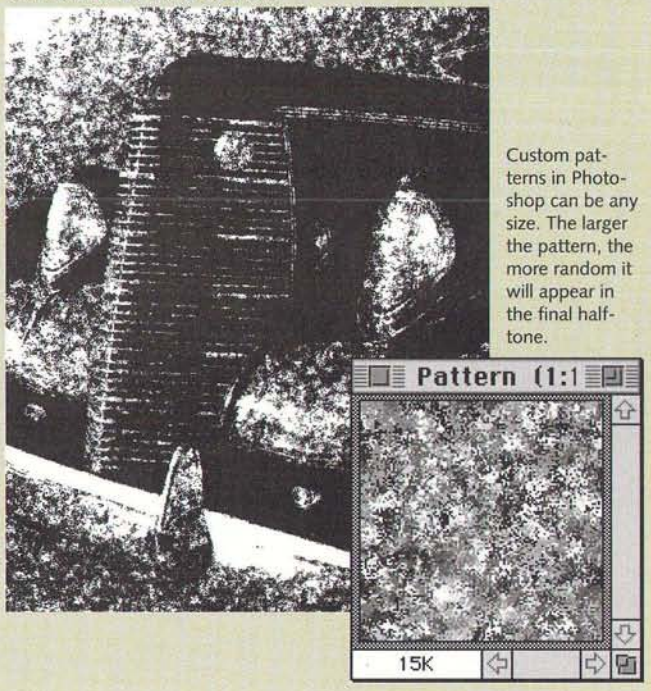
SQUARE



Custom Halftone Screens

A few programs, such as Adobe Photoshop, Letraset ColorStudio, and Aldus FreeHand, allow you to create custom halftone screens. The image below was screened using a custom pattern created in Photoshop.

CUSTOM HALFTONE SCREEN

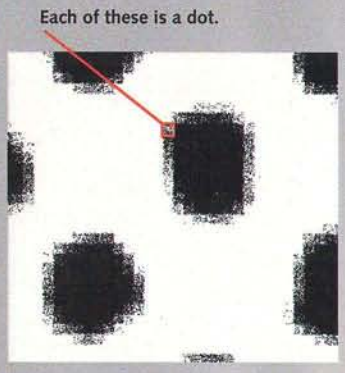


Custom patterns in Photoshop can be any size. The larger the pattern, the more random it will appear in the final halftone.

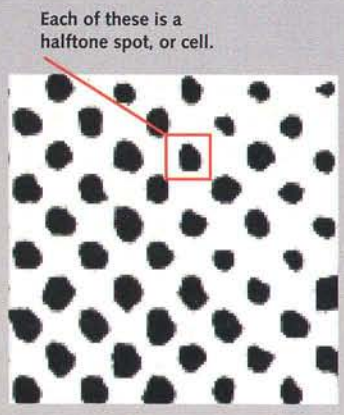
Dots versus Spots: A Glossary

One problem with understanding halftones is the fast-and-loose way that most people use the terminology—one word can mean several things. Here's a rundown of generally accepted definitions.

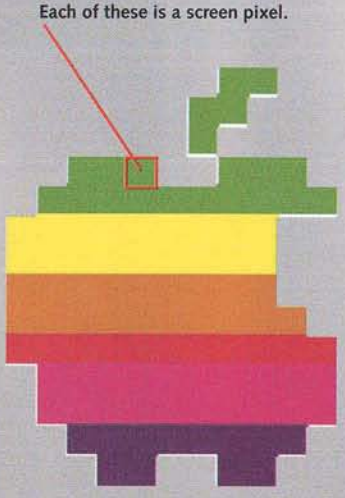
Dots: The marks that laser printers and imagesetters make on a page. Prepress experts always refer to the resolution of these devices in dots per inch (dpi), so this is a natural and inescapable term.



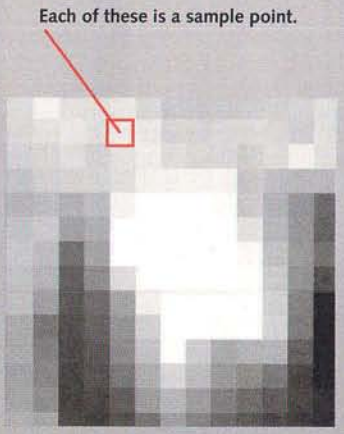
Spots, or Cells: In digital halftoning, these are made up of dots. A spot's size depends on whether it's in a dark area or a light one. They're called spots out of deference to the PostScript spot function, which controls their shape. They're called cells because they are often represented as a matrix, or grid, of dots. Printers traditionally call these things dots; this is the one term for which I have to break with tradition to achieve unambiguous terminology.



Pixels: Picture elements. The lighted elements that make up a screen image. Screen resolution is typically cited in dpi, but ppi is more accurate.



Sample Points: The elements making up a scanned image, or bitmap. A scanner samples an image every 1/300 inch, or every 1/72 inch, or whatever you choose. At each point, the scanner evaluates the sample, deriving a value. It's better to describe an image's resolution in sample points, or samples, per inch (spi), rather than the commonly used dpi, which we reserve for output resolution.



tors to understand. You should also consider these factors if different elements on a page use different screen settings (flat tints use one screen, for instance, while scanned images use another).

- **Using the Device Default** With most applications, if you simply create a document and print it on a PostScript device, you get the device's default screen settings. On 300-dpi laser printers, for instance, that's generally a 45-degree, 53-line, round-spot screen. You can experiment with your laser printer to determine its defaults, or ask your service bureau to determine the defaults for their devices.
- **Setting the Publication Default** Most publishing and illustration programs let you set up a publication default screen setting that overrides the device's default settings. The application applies its default setting to every element for which the screen isn't otherwise controlled. If you want everything in your document to print with a 75-line, 45-degree screen, you set that up as the publication default.

The method for setting the publication default ranges from very easy (type it in the QuarkXPress Page Setup dialog box) to somewhat complex (create a new PDX file for PageMaker using the PDX editor, then select that PDX in the Print dialog box). It varies enough that I (reluctantly) have to refer you to the documentation for the different programs.

- **Overriding Settings for Selected Items** Some programs give you the option of setting screens for individual items in a document. PageMaker and QuarkXPress, for instance, let you set the frequency, angle, and spot shape for imported bitmaps. FreeHand lets you set frequency, angle, and spot shape for any element. This object-level setting overrides the publication default, but only for that item. It's useful for special-effect screening (applying a 20-lpi, 45-degree line screen to a box, for instance), and for controlling screening for all your scans independent of other tints in the document.
- **Saving Settings in EPS Files** If you create a scan or illustration and save it as an EPS file, you can include screening instructions in that file. When you place that EPS image on a page in another application, the screening settings in the EPS file override the publication's defaults and even the item-level overrides you set in that application. EPS is the only file format that allows you to include screening instructions.
- **Overrides within Overrides** One final subtlety: Suppose you create an illustration in FreeHand, and set the screening for some of the elements in the illustration, but not all. Then you save the illustration as an EPS file and import it into QuarkXPress. The items within the illustration that have screening instructions set will use those settings. The other elements will print with the QuarkXPress default settings.

There's a whole lot more to know about halftoning and digital halftoning, some of which I'll be covering in an upcoming article on producing high-quality output from scanned images. For the time being, however, the basic rules and formulas laid out in this article will take you a long way toward that elusive goal—mastering the black art of getting good grays. m

STEVE ROTH is coauthor of *Real World PostScript* (Addison-Wesley, 1988) and *Real World PageMaker 4* (Bantam Computer Books, 1990), and editor of *Real World FreeHand* and *The QuarkXPress Book* (both from Peachpit Press, 1991).

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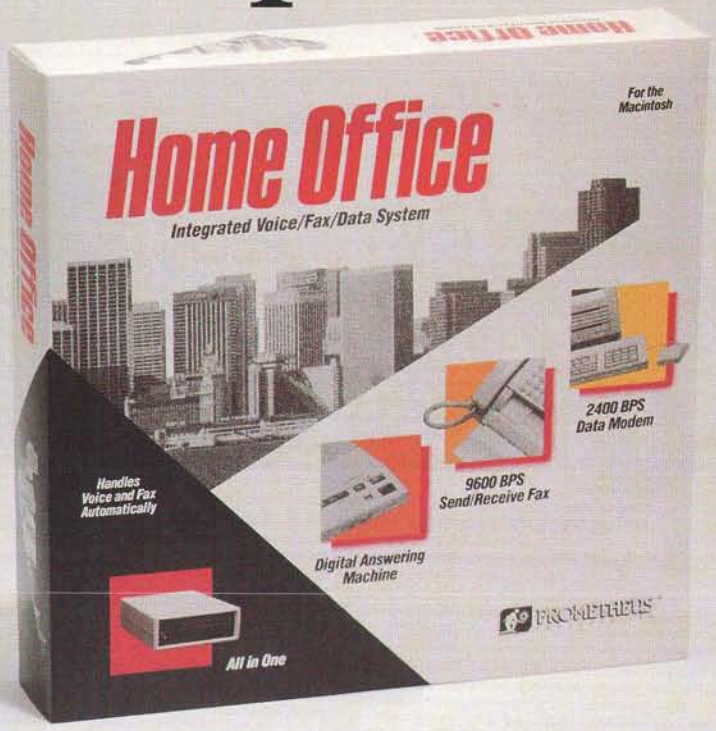

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The Bare Essentials for every Macintosh! Save $250 off list price on these three Best-Sellers. Here's what you get: **TouchBASE** lets you store information about personal and business contacts, alternative phone numbers, plus customize the fields. **Quicken**- enables you to revolutionize the way you balance your checkbook and plan your finances. It even prints checks and pays bills electronically. **After Dark**- will guarantee you'll never need to worry about screen burn-in again! Order today and you'll receive a FREE copy of **Tesserae**- a mind-rattling, addictive logic game.

Publisher: After Hours Software
BND0144

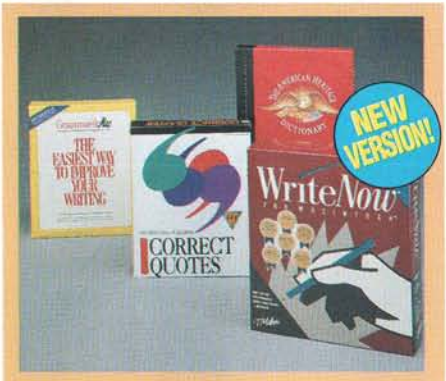
FREE Tesserae NEW! **$99**

Atlas Pro

Atlas Pro features a built-in spreadsheet that links database files to maps (down to street level) and includes query features that allow users to ask questions- and get answers- related to database or map information. Enter data directly into the spreadsheet, read in dBASE, FoxBase, and text files, or create live links to external databases and spreadsheets via System 7.

Publisher: Strategic Mapping, Inc.
BUS0239

$749



WriteNow Workshop

A complete set of writing tools for the Mac!
A bundle of 4 award-winning packages designed to improve your writing. Includes **WriteNow 3.0**, the fastest & easiest Mac word processor. WriteNow is designed for anyone who wants award-winning word processing power in a package that's small, blazingly fast, and fully compatible. WriteNow's size and speed make it the best choice for the Classic, LC, and PowerBook families. Bundle includes **Grammatik Mac 2.0** (the grammar checker that allow you to write with clarity and confidence), **The American Heritage Dictionary** (116,000-word electronic dictionary), and **Correct Quotes** (electronic catalog of over 5,000 quotes) for FREE!

Publisher: T/Maker
WRD0060

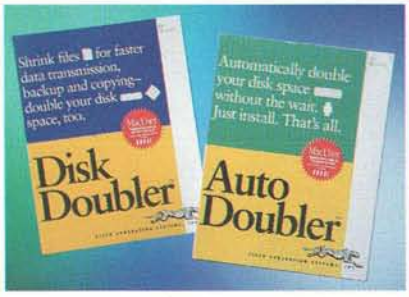
$149

Accountant, Inc. 3.01

"BEST ACCOUNTING PACKAGE" 1991 MacUser's Editors' Choice Award. More Features, more Power, more Flexibility. It's easy to use and gives you exceptional streamlining power. Every transaction is automatically posted to your General Ledger. Accountant, Inc.'s new revolutionary System 7 design gives you the advantage of customizing your forms, screens and reports by hot linking with your favorite forms design, spreadsheet and database programs. You get Invoicing, Accounts Receivable, Inventory, Accounts payable, Check Writing, integrated General Ledger and Payroll. Accountant, Inc. is now available in single and multiuser versions.

Publisher: Softsync, Inc.
FIN0048

$335



AutoDoubler or DiskDoubler 3.7

AutoDoubler is the easiest way to increase your hard disk capacity. It works in the background to automatically keep your hard disk compressed. It's lightning quick and completely transparent, so it won't interrupt your work. In fact, AutoDoubler's new patent-pending technique lets your Macintosh use files and applications while they are still compressed! It's fully compatible with almost all applications, desk accessories, and system extensions.
UTI0254

DiskDoubler 3.7 gives you total control of file compression-archiving for modem transfer, compressed backups, self-expanding files, and fast copying of files. AutoDoubler and DiskDoubler combined give you the ultimate in speed, convenience, and control. System 7 Savvy!

Publisher: Fifth Generation
UTI0179

$49ea.

Business Plan Toolkit or Business Management Toolkit*

Solutions and shortcuts for businesspeople who plan.

Business Plan Toolkit 4.0- Finally doing a business plan is easier than doing without one. MacUser gave it 4.5 mice and said "it guides you in a thoughtful, creative manner." Completely menu-driven financials and business charts, fully-linked forecasts, guided text writing. **FIN0116 $99**

Business Management Toolkit, a NEW product, includes business budgeting, milestones, strategy, tactics, and follow-through. Links to the business plan for planning and implementation.
BUS0284*
Both require Spread Sheets.
Publisher: Palo Alto Software

$99

ScanMaker II and ScanMaker II XE*

The new Microtek ScanMaker series provides a simple and affordable way to bring color and black-and-white images into your computer at resolutions up to 1200 dpi, and scans color photographs or artwork in full 24 bit color or 256 shades of gray. The ScanMaker II is bundled with Adobe PhotoShop LE. The ScanMaker II XE is great for scanning color or black-and-white images and is bundeled with a full version of Adobe's PhotoShop, the premier image processing software for the Macintosh.

Manufacturer: Microtek
II XE INP0247
II INP0246 $929

$1239*

StuffIt Deluxe 3.0 or StuffIt SpaceSaver*

StuffIt Deluxe 3.0 is the"Complete Compression solution". Only StuffIt Deluxe 3.0 can solve all your compression needs from archiving to transparent compression and includes StuffIt SpaceSaver. StuffIt Deluxe 3.0 is the fastest most efficient compression product available. Our new Add Match intelligently stuffs only the files that met the criteria that you specify.
UTI0302 $69

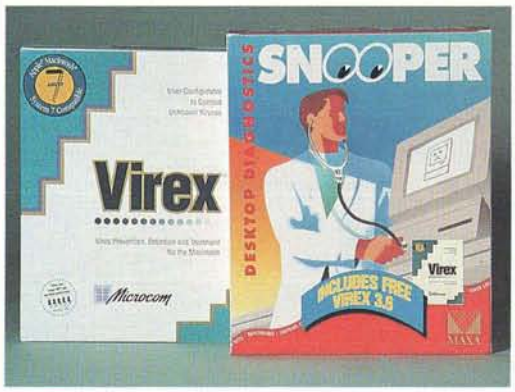
StuffIt SpaceSaver is unlike other compression products, it increases disk space (with lightning speed) without effort on your part. Have it work while your Mac is idle or when you say "Compress this for me." SpaceSaver provides complete on-the-fly compression in one package. SpaceSaver is also one of the least expensive, most productive and easiest to use compression products available.

Publisher: Aladdin Systems, Inc.
UTI0303

$35*

COMPUSERVE

You can now contact MacWAREHOUSE or place orders with us in the **Electronic Mall** on Compuserve. The **MacWAREHOUSE GO code** is **GO MW**. As always, you'll get fast, dependable overnight service and you can leave messages for Kerry or any of our support staff.



Snooper Kit 2.0 (contains NuBus card)

❼ Snooper 2.0 detects hardware problems and sources of intermittent failures. It performs over 200 major component tests, prints the results, and logs errors. It also does benchmark testing and reports on system configurations to allow technicians to find and fix problems quickly. Includes a NuBus card to check errors even when the screen displays a "Sad Mac." Now includes Virex FREE!

Requires: 2MB RAM.
Publisher: MAXA
UTI0337

$179

Effects Specialist or Layouts*

❼**Effects Specialist 2.0**-With version 2.0, the industry's first and finest font styling program gets even better! 120 dynamic effects, each modifiable 1,000s of ways. A new high-performance interface and full color support. Transform any PostScript, bit-mapped or TrueType font into exciting logos, headlines, flyers, stationery, etc. Use with any DTP, drawing, WP or paint program. Powerful, easy-to-use.
DTP0062 $99

Layouts - Punch up your Creativity! Postcraft's award-winning Layouts; professionally-designed page-layout templates for PageMaker. A fascinating variety of camera-ready B&W and color designs - 33 Brochures, 14 Newsletters, 82 Business cards, 35 Letterheads, 48 Envelopes and 2 business-reply cards. Customize with your own copy, fonts, and graphics. Output to any printer. All templates have crop, registration, and fold/score marks.
Publisher:
Postcraft International
DTP0063

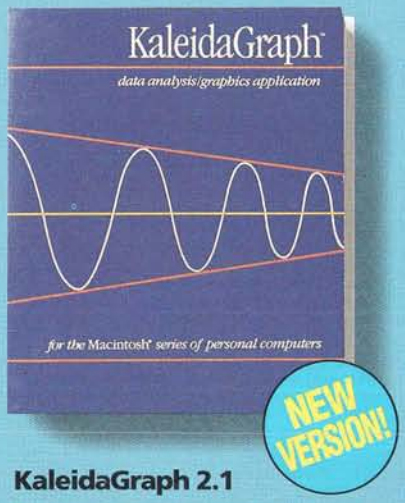
$75

Bridge 7.0

❼Bridge 7.0 pits you and your partner against two opponents on your Mac. Improved color graphics and screen layouts, plus enhanced bidding and play make it more fun. Your computer opponents have their own personalities, and digitized speech. Bridge 7.0 recognizes the stayman and blackwood conventions and allows you to adjust the style from conservative to aggressive. **Publisher: Artworx**

Also available:
Grail Quest- A graphic adventure. **ENT0262 $19**
KaleidoKubes- A mind-bending game. **ENT0417 $12**
Bridge 7.0
ENT0461

$35



KaleidaGraph 2.1

❼KaleidaGraph simplifies the process of analyzing and presenting statistical information. It provides 16 different graph structures, including scatter, histogram, probability plot, polar, as well as more comon types, such as line, bar, and pie. You can crunch lare amounts of data (up to 32,000 points per column), and plot up to 20 variables at once. Supports PostScript coompatible printers including the DeskWriter C.
Publisher: Synergy
STA0018

$149

MicroPhone Pro

❼With MicroPhone Pro you can connect to any on-line service at the touch of a button. Use its library of ready-make scripts to access CompuServe, GEnie, or MCI Mail. You also can create your own scripts. MicroPhone Pro supports System 7 Publish and Subscribe, Apple Events, Balloon Help, and Aliases. It allows you to connect to any TCP/IP host network, such as Internet. It also includes fax sent and receive software for fax modems. **Publisher:**
Software Venture
COM0138

$219

Super 7 Utilities

❼Included are: Mighty Menus to give you the ability to tear menus from the menu bar of any application; Printer Picker lets you quickly select a network printer without visiting the Chooser; Desktop Extras to make filing files at the finder faster; Super Comments which preserves the Finder "Get info" comments during desktop rebuild, and lets you edit or view them in any application; Trash Alias which prevents orphaned aliases; Helium Pro makes Balloon Help practical and Speed Beep Pro lets you customize your Mac's warning sounds.
Publisher: Atticus UTI0306

$65

Sprout! or Design Your own Home:*

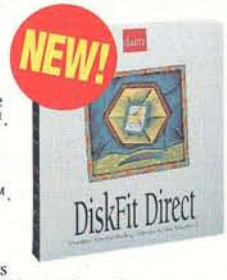
❼ **Sprout!** is a complete computer planning tool for vegetable gardeners. Produces a graphic, scalable garden plan with correct plant and row spacing. Contains fully editable database of vegetables for 7 climate regions. Prints garden layouts, calendars, shopping lists, and reports. **GRA0339**

$45

❼ Use **Design Your Own Home: Architecture, Interiors, or Landscape** to create the right look for your home or yard. Create floor plans and building plans with structural details. Do individual room plans and kitchen/bath design. Then complete your dream house with graphic landscape plans. Interiors and Landscape programs generate 4 side views from top-view perspective. Sample plans included.
Publisher: Abracadata

$59ea.*

DiskFit Direct



Backup Solutions. For easy, basic backup to a SmartSet™ of floppies, use the NEW **DiskFit Direct™**. For SmartSets, scheduling capabilities, and automatic backup to AppleShare® servers, use **DiskFit Pro™**. **Retrospect©** is your complete automatic, unattended backup and archiving solution. Supports all tape, optical, and removable cartridge media.
Publisher: Dantz
DiskFit Pro UTI0246 $74
Retrospect UTI0118 $148
DiskFit Direct UTI0333

$29

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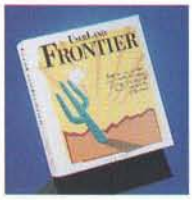
UserLand Frontier



With UserLand Frontier, you don't have to choose between pretty icons and the power to customize and automate your Macintosh. For the first time, you can have power and ease-of-use. Frontier has all the development tools you need to get your scripts running quickly, including a full script debugger and structured symbol tables you can watch and edit while your scripts are running. When you're done, you can link scripts into Frontier's editable menu bar, or save them to the Finder desktop.

Publisher: UserLand
UTI0272

$189

Star Trek™: The Screen Saver* or AfterDark Bundle

Star Trek™: The Screen Saver

Beam aboard the Enterprise™ with Captain Kirk and Mr. Spock on a mission to prevent screen burn-in. Encounter trilling Tribbles, Klingon battlecruisers, and burrowing horta. This all new screen saver provides over 15 animated displays, password protection, SystemIQ and full compatibility with After Dark. **UTI0315**

After Dark/More After Dark Bundle

The Ultimate Screen Saver Collection. Over 30 displays including Flying Toasters and Fish! With sound and password protection. More After Dark—Over 25 incredible new displays for After Dark.

UTI0231 $45
Publisher: Berkeley Systems

$35*

PowerRunner™

PowerRunner combines Power Up's popular *Calendar Creator*™ and *Address Book Plus*™ software with the best-selling *Day Runner*® personal organizer. Calendar Creator handles everything from appointments to repeating meetings and holidays. Print your calendars in any format, from daily to yearly, then insert in your Day Runner binder. Address Book Plus produces top-quality address book pages, mailing labels, rotary file cards, envelopes, and unique InstaBooks™. Print double-sided address pages to fit Day Runner and other popular organizers.

Publisher: Power Up! Software
Also available:
Calender Creator BUS0073 $44
Address Book Plus BUS0096 $52
BUS0268

$99

Mighty Draw

Mighty Draw is an affordable, general-purpose, *object-oriented* drawing program, that allows the user to create pie, column, bar, and flow charts, graphs, electronic schematics, network diagrams, flyers, newsletters, greeting cards, logos, and more! Mighty Draw includes hundreds of pre-drawn symbols, and access to multiple object libraries *simultaneously*! Virtually any symbol from other programs can be added, making Mighty Draw an all-encompassing drawing program.

NEW!

Publisher: Abracadata, Ltd.
GRA0399

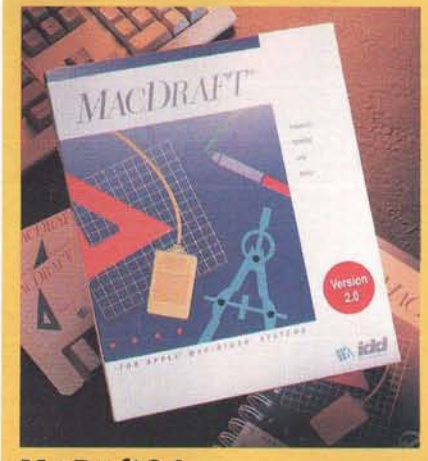
$25

Infini-D 2.0

Create dazzling images with the power of Infini-D's Three-dimensional environment. The easy-to-use Infini-D, now in an awesome second generation! Infini-D 1.0 was the package that brought 3D graphics to the rest of us. Infini-D 2.0 combines this friendly interface with sizzling 3D power: Infini-D's incredible new shader and raytracer now can render scenes up to 500% faster! Instant conversion of EPS files into 3D objects, Infini-D's awesome metamorphosis capabilities, precise PICT mapping control, and extensive QuickTime support make Infini-D 2.0 the 3D package of choice for graphic arts and multimedia professionals.

Publisher: Specular International
GRA0303

$699



MacDraft 2.1

MacDraft is designed specifically for architectural/engineering drawing and drafting, and technical illustration. It provides a fully scaled drafting environment that closely emulates the way you work and think when using the drafting table. MacDraft offers a full complement of drawing tools that are designed to provide extensive control over the creation and editing of objects. Tools include lines, circles, rectangles, arcs, polygons, ellipses, splines or Bezier curves, and freehand shapes. MacDraft provides a number of options that allow you to configure tools to meet your drawing needs. Use MacDraft to get the results you need.

Publisher: Innovative Data Design
CAD0039

$279

White Knight V.11

Winner of 11 awards, White Knight will give you powerful, painless communications at an affordable price. Geared to all levels of experience, it supports file transfer protocols like ZMODEM, 3 styles of YMODEM, Flash & 3 styles of Kermit. Terminal emulation supports TTY, VT52, VT100 & VT102 as well as 32 bit color QuickDraw & large monitors. Comes with a FREE copy of Okyto (a revolutionary, new Mac-to-Mac file transfer program & $39.95 value).

Publisher: FreeSoft COM0060

$85

TRISTAN: Solid State PINBALL

If you like pinball, you'll love TRISTAN! With realistic ball action, colorful graphics and exciting sound effects, TRISTAN provides amazingly accurate pinball simulation. Flip and nudge your way to the highest score possible using great features incorporated from traditional pinball games, including multi-ball, extra ball, jackpot, and bonus. TRISTAN was a finalist for Best SimulationGame, 1991, by SPA Excellence in Software Awards.

Requires: 2 MB RAM; 256-color monitor; System 6.0.7 or later.

Publisher: Amtex Software Corporation
ENT0443

$39

TouchBASE/DateBook Bundle -with Redux FREE!

Keep track of your life and the people in it with the TouchBASE/DateBook Bundle. TouchBASE lets you store information about personal and business contacts, alternative phone numbers, plus customize the fields. Also allows you to print envelopes and mailing labels, including postal barcodes, and fax sheets covers. DateBook is the ultimate personal time manager for Macintosh. Instant access and advanced scheduling keeps you on top of your appointments and things to do. Shows your schedule in multiple formats including test, Gantt chart and time bar. DateBook's views enable you to see your schedule quickly in as much detail as you like. Order today and you'll receive a copy of **Redux**, a quick and easy backup utility. **A $80 value, FREE with your order.**

Publisher: After Hours Software
BND0150

FREE REDUX

$99

POWER USER SIMMS ONLY

$49*

Due to federal tariffs imposed on SIMMs, prices may vary significantly. Please call for the latest prices and availability.

FREE! STEP-BY- STEP VIDEO INSTRUCTIONS**

A Power User Memory Expansion Kit will dramatically increase the power of your Mac. And our fast, reliable overnight service will have your Kit in your hands tomorrow!

MORE BRAIN POWER FOR YOUR MAC

Never again will you have to quit your word processor just to answer a question about a spreadsheet. Install extra memory and you can leave a letter open while you refer to last month's sales figures.

You can edit those monstrous scanner files with advanced graphics applications or develop your own custom HyperCard stacks. More memory means more power at your fingertips.

PLUG IN INSTALLATION

Adding memory doesn't require technicians in lab coats. You'll find installation at home easy when you follow our FREE** step-by-step installation video instructions. Just open your Mac, slide out the main circuit board and plug in your SIMMs.

WHAT DO I NEED?

Our helpful sales and technical staff is standing by to answer any questions and take the mystery out of memory upgrades. Memory cards come with one megabyte on each card and are usually sold in pairs — (2 @ $49 ea.)

The chart explains exactly what you need to achieve the desired level of performance.

To open your Mac Plus, SE, and Classics you'll need a specially designed tool — it's available from us as part of a handy tool kit for just $9.

WHAT YOU NEED TO KNOW

Memory chips come factory-installed on plug-in cards, called SIMMs (Single Inline Memory Modules). Each one megabyte SIMMs card holds eight top quality, memory chips. We carry chips by all the major manufacturers like Texas Instruments, Intel and Samsung.

Prices can vary a lot, based on quality, speed and demand. At press time our price for 1MB, 120ns SIMMs is $49.

Please call for the very latest prices and availability. Our sales staff will tell you what you need and help you make your choice an easy one.

To upgrade a 4-socket Mac Plus or SE to this amount of memory	Do this: (Install in multiples of two only) SIMMs must be 150ns or faster
2 MB	Remove all four existing 256k SIMMs, install two 1 MB Simms, leave two sockets for future expansion.
2-1/2 MB	Remove only two 256k SIMMs, install two 1 MB SIMMs.
4 MB	Replace all four 256k SIMMs with four 1 MB SIMMs.
To upgrade a 2-socket Mac Classic II or LC to this amount of memory	**Do this: (Install in multiples of two only) SIMMs must be 100ns or faster**
4 MB	Install two 1 MB SIMMs
To upgrade a 2-socket Mac LC II to this amount of memory	**Do this: (Install in multiples of two only) SIMMs must be 100ns or faster**
6 MB	Install two 1 MB SIMMs.
To upgrade a 8-socket Mac II, IIx, IIci, IIcx or SE/30 to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 120ns or faster**
4 MB	Remove all four existing 256k SIMMs, install four 1 MB SIMMs, leave remaining sockets for future expansion.
5 MB	Keep existing 256k SIMMs, install four 1 MB in remaining sockets.
8 MB	Remove all four 256k SIMMs, install eight 1MB SIMMs
To upgrade a 4-socket Mac IIsi to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 100ns or faster**
5 MB	Install four 1 MB SIMMs.
To upgrade a 4-socket Quadra 700 to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 80ns or faster**
8 MB	Install four 1MB SIMMs.
To upgrade a 16-socket Quadra 900 to this amount of memory	**Do this: (Install in multiples of four only) SIMMs must be 80ns or faster**
4 MB	Install four 1MB SIMMs.
8 MB	Install eight 1MB SIMMs.
12 MB	Install twelve 1MB SIMMs.

SPEED

Do you need 80, 100 or 120 Nanosecond (ns) chips? Nanoseconds are billionths of a second, so an 80 ns chip responds faster than a 100ns chip. The original Mac used relatively slow 150ns memory chips. The 68020 processor needs 120ns (or faster) chip, and the 68030 Macs like the speedier model.

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Install a MacWarehouse Expansion Kit and working with your Mac will never be the same! Call us now. We'll help you select just the right Memory Upgrade, and we'll ship it overnight for just $3.

CHP 0012 120ns SIMMs.....$49

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Overnight Delivery Only $3.00!

Call 24 hours a day, 7 days a week

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MACWAREHOUSE 30-DAY MONEY BACK GUARANTEE

If, for any reason, you are dissatisfied with your Power User Memory Kit, you may return it for a full refund within thirty days of purchase. All you have to do is call us for a return authorization number and return this product, postage paid, in its original condition, with the original packaging and documentation.

TWO YEAR WARRANTY.

MacWarehouse also guarantees its Memory Kits against manufacturer defects for two years from the date of purchase. We will repair the item or replace it at our discretion.

MW0293

* SIMMs prices vary. Call for latest information.
** Limited Offer! Free video with purchase of 2 or more SIMMs.

Circle 150 on reader service card

Reviews

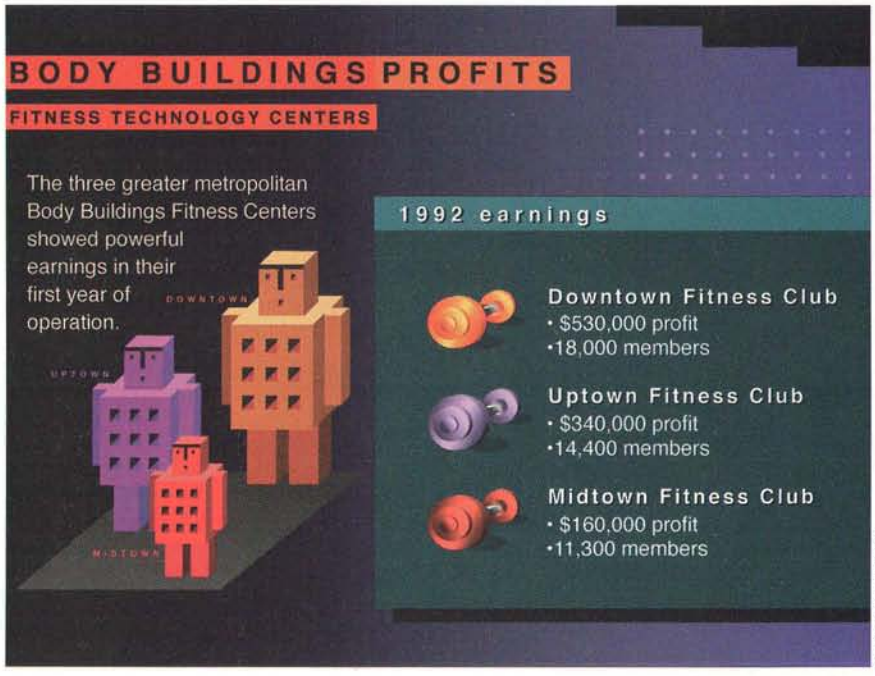
IN THIS ISSUE: ElectricImage Animation System, Action, Power Portrait, Microsoft Works, Magnet, WideWriter 360, SimLife, Inspiration 4.0, Sketcher 1.0, Insanity, and more

Conventional Presentation Program

Microsoft PowerPoint 3.0

PROS: Automated templates; extensive system of master layers; comes with OLE software architecture; reliable cross-platform compatibility; includes Equation Editor; screen-show capabilities include QuickTime support, flying bullets, smooth color transitions, and on-screen annotation. **CONS:** Small collection of predefined templates; can't blend between two custom colors when defining gradient background; limited zoom options; can't embed TrueType fonts. **COMPANY:** Microsoft Corporation (206/882-8080). **REQUIRES:** Mac Plus; 4MB of RAM; hard drive; 1.4MB floppy drive; System 7. Recommended: Color monitor; QuickTime. **LIST PRICE:** $495.

MW ★★★★



GLENN MITSUI/STUDIO MD

SINCE DECEMBER 1988, WHEN MICROsoft shipped PowerPoint one month after the release of Aldus Persuasion 1.0, PowerPoint has remained frozen in time. To put it in perspective, the cold war ended, Iraq invaded and then fled Kuwait, the Bush administration came and went, and Microsoft PowerPoint shifted from version 2.01 to 2.01f. Short of bribery, PowerPoint was bound to rank dead last in any survey of Macintosh presentation programs. That's why the newest update is so remarkable. Though occasionally stingy in the flexibility department, PowerPoint 3.0 offers more features per kilobyte than any other presentation program for the Macintosh.

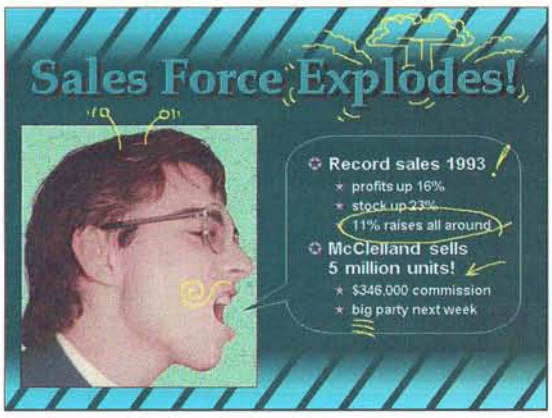
Making Up for Lost Time

THANKS TO THE LONG HIATUS, VERSION 3.0 expends much of its energy playing catch-up with the former presentation kingpin, Aldus Persuasion. Like Persuasion, PowerPoint now offers automated templates for managing the appearance of your slides. You can change color schemes, text formatting, and slide backgrounds by simply importing a new template. You can even use an existing presentation file as a template. But whereas each Persuasion 2.1 template contains several master layouts so you can vary the slides' appearance while maintaining a consistent design scheme, PowerPoint offers only one master layout per template. And stocked with only 40 designs, its ready-made template collection is pretty darn paltry.

As if to make up for its middling templates, PowerPoint provides outstanding organizational options, matching Persuasion item for item. Not only can you use a master slide to position repeating background elements and specify the formatting of titles, body text, and bulleted items, but you can also establish master layers to aid in the printing of outlines, speaker notes, and handouts. You can open multiple files, rearrange your presentation in a slide-sorting window, check spelling, and search and replace key phrases. A text ruler enables you to specify up to five levels of indentation. You can assign each level a special bullet by selecting a symbol from a table that shows every character in the current font.

PowerPoint's color capabilities surpass Persuasion's for convenience and ease of use. In PowerPoint, you can give a new color scheme to a single slide or an entire presentation at will. If you're not comfortable with setting up your own color scheme, PowerPoint breaks with Persuasion and walks you through the process. For example, after you select one of 90 background colors, PowerPoint brings up a sampling of text colors that go well with the selected background.

Then, based on the color you selected for your text, the program displays several palettes of miscellaneous colors that go with both background and text. Even if your tastes run toward avocado appliances against cornflower blue wallpaper, you can't go wrong. In typical fashion, PowerPoint supports 24-bit color and enables you to import PICT, TIFF, and EPS scans and artwork. You can also create gradient backgrounds, though this feature could stand some rethinking (PowerPoint lets you blend between any color and a lighter or darker version of that same color only; you can't blend between two custom colors, nor can you create radial gradations).



Doodling on the Slide You can write all over a slide to emphasize points or just to while away the time during an on-screen presentation. Though you're limited to a single color (any color you like, so long as it's yellow), you can highlight images and QuickTime movie frames, as shown by the additions made to my otherwise dashing profile.

The Microsoft Way

IN TERMS OF CONVENIENCE FEATURES, PowerPoint has Persuasion beat. PowerPoint takes the guesswork out of opening presentations and templates by providing a fast-displaying thumbnail preview of any file you select. The tools and icons that wreathe the presentation window let you quickly access formatting options, drawing tools, and magnification settings. (I would be willing to trade some of this convenience for a more extensive collection of zoom options. Currently, PowerPrint's zoom levels jump from 66 to 100 to 200 percent with no variations in between.) From the desktop publishing arena, PowerPoint borrows the Smart Quotes option, which replaces generic straight quotes with meaningful curly quotes. Finally, as in any self-respecting Microsoft product, you can drag selected text in an outline rather than having to rely on the Clipboard to rearrange words and paragraphs.

Snubbing System 7's Apple events, PowerPoint is the first product on the Mac to include Microsoft's OLE (Object Linking and Embedding) software. Ported from Microsoft Windows in the form of 100K worth of system extensions, OLE acts like publish and subscribe—which PowerPoint also supports—without the hassle of having to save a file to disk. You can copy data, text, and/or graphics from an OLE-compatible server and then paste it as an embedded object into an open presentation.

To edit the embedded object from inside the presentation file, simply double-click on it. PowerPoint launches the embedded object's application and displays the object in a new window. After you make your changes, close the window—no saving required—to return to PowerPoint and see the up-dated object in the presentation. You can also use the Insert command to access the self-running Equation Editor and Microsoft Graph applications, both bundled with PowerPoint. Using OLE, I experimented with embedding objects using formatted text from Word 5.0a and a 3-D chart from Excel 4.0. The Excel chart was unable to create a worksheet, preventing me from editing the data, but otherwise OLE worked like a dream—better, frankly, than other techniques I've seen performed with Apple events, and better than publish and subscribe.

As if to strengthen its footing on the Mac, PowerPoint ships with a slew of TrueType fonts, most of which are no more than renamed versions of well-known classics. Arial is TrueType for Helvetica, Book Antiqua equals Palatino, Century Gothic takes the place of Avant Garde Gothic. Only Wingdings is unique, this being the symbol font responsible for the controversy surrounding the *New York Post*'s "Program of Hate" article. (In case you don't know what I'm talking about, typing *NYC* in this font creates a poison symbol followed by a Star of David followed by a thumbs-up. Microsoft claims that any such relationship between letter keys and symbols is purely coincidental; very possibly it is, in light of the fact that the font has symbols for Christianity and Islam as well as a spectrum of other common icons—but it reportedly ruffled some feathers in the Big Apple and elsewhere.)

If your business requires a lot of file-swapping between Macintoshes and DOS machines, PowerPoint surpasses Persuasion, but only just barely. PowerPoint includes 16-color versions of its templates so you can prepare your presentation for display on a VGA monitor. The Macintosh and Windows versions of PowerPoint share the same menu commands, tools, and icons, and have similar keyboard equivalents and nearly identical native file formats. This allows PowerPoint to retain TrueType fonts and embed OLE objects when you switch platforms. However, QuickTime movies and 24-bit images are not retained when you switch to Windows. You should also note that while PowerPoint for Windows can embed TrueType fonts so that all text appears in the correct font even when played on a different machine, PowerPoint for the Macintosh lacks this capability.

Screen Display

POWERPOINT'S 35MM SLIDE-printing capabilities are nothing to write home about. Though software is included that enables you to prep files and download them to a Genigraphics service bureau, PowerPoint provides no inherent printing advantages over Persuasion. Where PowerPoint does raise the stakes is in the on-screen presentation department. Like Persuasion 2.1, PowerPoint lets you embellish your screen shows with QuickTime movies. While Persuasion provides a more versatile build feature—enabling you to assign text blocks and images to separate layers and then display layers sequentially—PowerPoint provides better transition effects. For example, you can animate bulleted items by flying them in from off the screen. You can even preview transition effects and specify the speed at which transition effects occur independently of the CPU speed.

When you have to rely on an 8-bit monitor or lower, PowerPoint automatically dithers 24-bit images and gradient backgrounds and dynamically adjusts the palette to include the optimal collection of colors. To eliminate flickering when you're moving between different-color slides, PowerPoint animates color adjustments to coincide with the transition effect. If you run your presentation on a machine that lacks some of the fonts you've used, PowerPoint provides a dialog box that lists your presentation fonts and suggests alternatives that you can substitute for them. Finally, you can annotate a slide by drawing on screen, much as you might embellish an overhead projection with a felt-tip marker (see "Doodling on the Slide").

I encountered only one performance problem. If you rely on ALSoft's MasterJuggler type-management utility, you'll

continues

need to disable it when using PowerPoint. If you don't, PowerPoint can take several seconds to perform simple actions like selecting text blocks and choosing commands. On the bright side, if you rely on an extensive font library, you'll be gratified to know that PowerPoint supports Adobe Type Reunion, even inside dialog boxes.

Like other Microsoft products, Word and Excel among them, PowerPoint is a program with obvious though not extensive deficiencies—problems that could be cleaned up with a minor upgrade. Based on the past performance of the product, this comes as no surprise. What does surprise me is that PowerPoint also joins the ranks of Word and Excel in dominating its class. For the first time since Persuasion's debut four years ago, Aldus no longer owns the presentation market.
—DEKE McCLELLAND

Multimedia/Animation Program

MacroMind Director 3.1

PROS: Imports, edits, and exports QuickTime movies; new Lingo commands; includes MacroMind Accelerator. **CONS:** Complex interface; can't import TIFF images; Accelerator cannot accommodate bit-depth incongruities; overpriced. **COMPANY:** Macromedia (415/252-2000). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.7. Recommended: 8MB of RAM; color monitor. **LIST PRICE:** $1195.

MW ★★★

IF YOU'VE EVER USED MACROMIND Director, you know it to be a powerful and versatile multimedia authoring tool with an extremely daunting interface—hardly the thing for the casual user but just the ticket if you're a multimedia enthusiast who's grown frustrated with the limitations of traditional presentation and 2-D animation programs. Director also satisfies disenchanted HyperCard users with Lingo, a scripting language, and an integration of XObjects; the latter enable you to add drivers and other coded routines to the resource fork of a Director file. You can even integrate HyperCard-compatible XCMD and XFCN resources into Director scripts, as long as these resources do not call on commands and capabilities specific to HyperCard.

In addition to fixing a long list of problems throughout the program, Director 3.1 expands on its predecessor's capabilities in three key areas: the new version adds 23 scripting commands; it lets you import and edit QuickTime movies; and it includes MacroMind Accelerator, a utility that compiles movies into a faster playback format. But while the expanded capabilities are fine, they come at a price. At a list price that is $200 more than Director 3.0, this is one update that previous owners of the program—especially those who purchased Accelerator separately—can afford to miss.

QuickTime Gets Quicker

UNLIKE SOME OTHER PRODUCTS THAT have added QuickTime support, Director 3.1 allows you to do more than play a movie and adjust its volume. In fact, most of the program's new capabilities revolve around QuickTime. As with any other *castmember*—whether it's a graphic, text block, or sound—you can create scripts that modify a movie's behavior. Of Director's new Lingo commands, nearly half of the commands enable you to program adjustments to QuickTime castmembers, find out the duration of a movie, play the movie backward, specify the frames at which the movie starts and stops, and so on.

Even though MacroMind Director was not specifically designed for this purpose, it suffices as a QuickTime movie editor. It can play a movie over a specified duration of frames—just like a sound—while it animates other castmembers in front of and in back of the movie. You can cut away frames if a movie is too long. You can also combine two different movies by copying frames from the first movie and pasting them into the second. When you have finished integrating text, graphics, and sounds with your QuickTime castmembers, you can export the whole thing to the QuickTime format. If you like, Director can crop or scale your file down to the 120-by-160-pixel QuickTime 1.0 standard.

Accelerator 3.1 also supports QuickTime movies, though it strips the movie—as it does the rest of a Director file—of any sound. As always, Accelerator performs a remarkable job of compiling Director files for play at speeds of 30 frames per second and greater. You can also make simple tempo adjustments to a file. My only complaint with Accelerator is an old one: the utility requires that the bit depth of your monitor match the bit depth of your Director file. For example, if you want to compile an 8-bit movie, then you have to set your screen depth to 256 colors. I allocated 10MB of application RAM to Accelerator under System 7.1 and then tried to accelerate a 1.3MB 8-bit movie while the monitor was set to millions of colors. Five minutes later, Accelerater gave up because the image was too complex, and then the program unexpectedly quit. With the monitor set to 256 colors, Accelerator compiled the file in about two minutes with only 4MB of RAM.

18 Percent Annual Inflation

DIRECTOR OFFERS A FEW OTHER MINOR enhancements, including support for the Microsoft Windows media-control interface and a Lingo command that interprets large, double-byte character sets, such as the ones used in international alphabets and Apple's System 7.1 WorldScript. But the most significant enhancement is Director's new price tag. What began as a $695 product four years ago—not counting a previous $295 incarnation as VideoWorks—increased to $995 with version 3.0. No more than a minor update, version 3.1 adds a whopping $200 to the price tag ($149 for registered users of Director 3.0). Granted, that barely covers the $195 Macromedia charges for the Accelerator utility on its own, but now you have to buy the utility whether you like it or not.

Go ahead, call me Ebenezer. Say I pinch pennies so hard they give up and become dimes. After all, there's no denying that Director 3.1 is twice the product it was back in its $695 days. But so are leading applications in every other class of software: QuarkXPress, Microsoft Word, Aldus Persuasion. The difference is that not one of these programs has added so much as a dollar to its price tag over the years, much less nearly doubled it. Macromedia's persistent attention to its bottom line greatly diminishes the value of a strong piece of software.
—DEKE McCLELLAND

The Many Windows of Director MacroMind Director can now accommodate QuickTime movies as castmembers. As with sounds, you can play a QuickTime movie simultaneously with animation created inside Director.

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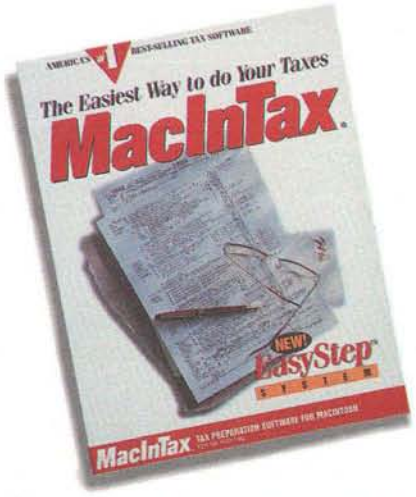

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Personal Time Manager

DateBook 1.5.1

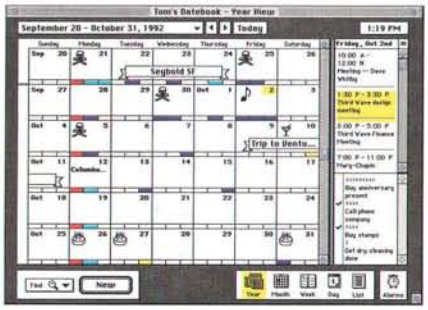
PROS: Improved handling of recurring events; printing bugs fixed. **CONS:** PowerBook screen-redraw problem. **COMPANY:** After Hours Software (818/780-2220). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; System 6.0.5. System 7.0 for TouchBase 2.0 integration. **LIST PRICE:** $125.

MW ★★★★

WHEN I REVIEWED DATEBOOK 1.0 (*Macworld*, *Reviews*, October 1992), the program had many strengths but suffered from the version 1.0 curse: some features were poorly implemented, and there were bugs. Version 1.5.1 fixes those bugs, improves some old features, and adds some welcome new features.

DateBook's printing has been improved. DateBook 1.5.1 now lets you include the Description field when you print views, and you can now correctly print weekly views in day-planner formats. The major printing bugs, which included problems with background printing and incorrect text scaling, have been fixed. After Hours has also added a page in the manual that shows, with diagrams, how to print double-sided day-planner pages.

The program's multiuser feature has been included in this version. I was able to share the calendar data file with three Macs using System 7 file sharing with no problem. I also had no problem accessing information across the AppleTalk network. In order to keep network traffic to a minimum, each client has control over how often his or her view of the calendar is updated. Like DateBook 1.0, version 1.5.1 lets you associate an alarm with an event or a to-do item. At a specified time, the alarm pops up a reminder dialog and plays a sound. In multiuser mode, however, alarms apply only to the user who sets them; you can't set one alarm to go off for all users.



Years and Dates DateBook's Year view lets you see events for several weeks at a glance. Note the Event and To Do lists on the right side of the screen with two overlapping events, and the listing for Columbus Day on October 12. The banners show events that occur over multiple days. In this screen the skull and crossbones icons represent deadlines, the musical note is a concert, and the cakes are birthdays. The blue, yellow, and red bars are busyness indicators.

Most welcome in DateBook 1.5.1 is the improved handling of recurring events. In DateBook 1.0, when you set a recurring event, all occurrences are saved as separate events, with no link between them. If you want to change the time of a recurring event, you have to change each event separately. In the new version, if you change one event of a recurring chain, DateBook asks if you want to apply the change to some or all of the other events in the set.

After Hours has also added some new features. The program now handles events that overlap in time (see "Years and Dates"). You can display the text of events and to-do items in each day in the calendar views. Other new features include a Today button at the top of each view that takes you to the current date in one click; a faster way to reach any date (option-clicking on the Date Selector pop-up menu brings up a calendar window showing the entire year); improvement to the Holiday schedule (holidays now show up in the views); and the addition of keyboard commands.

DateBook 1.5.1 is a more stable product than the original version. I experienced no crashes and found only one screen-redraw problem, and that occurred only on PowerBooks. (The company plans to fix this problem in the next version.) Integration with TouchBase, After Hours' address manager, has also been improved. This integration feature looks up address and telephone information from the TouchBase data file and inserts it into a DateBook event or to-do record. You can also post information from DateBook to TouchBase.

DateBook still has some room for improvement. I'd like to see it implement the calendar-updating capabilities of Now Software's Now Up-to-Date; Now users can have their own personal calendar, which updates when the user connects to the network calendar server. One of DateBook's most appealing features is that you don't need to have the program open to work with your events or to-do's; the program has a small window that pops up in the Finder that lets you view or change your schedule. I wish you could also add alarms from this Finder palette the same way you can add and modify events and to-do's. But these features would be icing on the cake. With the improvements in DateBook 1.5.1, I can now recommend the program wholeheartedly to anyone who needs a personal time manager.—TOM NEGRINO

Optical Character Recognition

TypeReader 1.0

PROS: Straightforward interface; supports HP's AccuPage technology; excellent manual; good format-recognition features. **CONS:** Stiff hardware requirements; limited formatting features in editing window; no support for publish and subscribe or Apple events; no training features. **COMPANY:** ExperVision (408/428-9988). **REQUIRES:** Mac II; 4MB of free RAM; 9MB of hard drive space; SuperDrive (800K disks available by request); System 6.0.5. **LIST PRICE:** $695.

MW ★★★

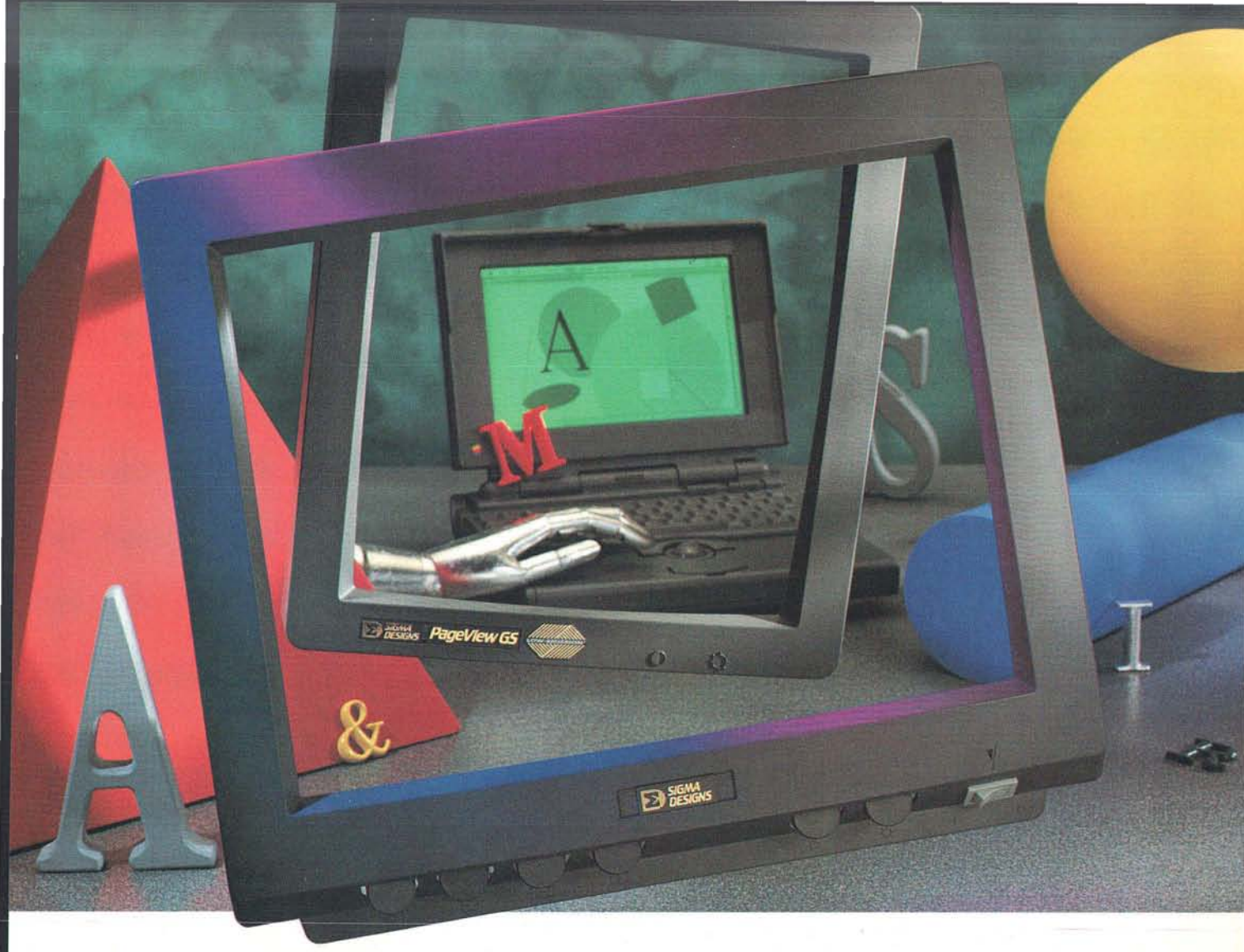
A LARGE SELECTION OF OCR (OPTIcal character recognition) programs are available for the Mac, but most don't do a good job of translating page scans into editable text files. In Macworld Lab tests performed last year, only Caere Corporation's OmniPage Professional and Xerox Imaging Systems' AccuText delivered acceptable accuracy across a wide range of documents (see "From Page to Pixel," *Macworld*, July 1992).

OmniPage and AccuText have company now. ExperVision recently released a Macintosh version of TypeReader, an OCR package that debuted under the Microsoft Windows environment for DOS PCs. Although TypeReader doesn't do everything its competitors—particularly OmniPage Professional—can do, it does combine speed and excellent accuracy with a straightforward operating style. It's a major contender among high-end OCR programs.

Like its competitors, TypeReader has hefty hardware requirements, starting with 9MB of hard drive space and 4MB of RAM. (That's 4MB of *free* RAM, not a 4MB Mac. If you're running System 7, you need an 8MB machine to run TypeReader.) If you have an original Mac II, you must trade TypeReader's high-density disks for 800K floppies. The TypeReader box doesn't list this requirement; it is mentioned in a text file on one of TypeReader's disks, but you can't read the file unless you have a SuperDrive.

TypeReader supports most of today's popular scanners, including models from Apple, Abaton, Dest, Hewlett-Packard, La Cie, and Microtek. Like OmniPage Professional and AccuText, TypeReader

continues



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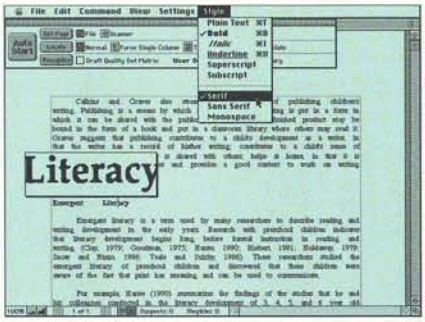
also supports HP's AccuPage technology, which allows the OCR program to adjust the brightness and contrast of the scan in order to better capture text printed on shaded backgrounds.

TypeReader can also open TIFF and PICT image files created by other scanning software. Unlike OmniPage Professional, TypeReader provides no image-editing capabilities. You cannot, for instance, touch up a damaged character or erase a coffee stain.

One way an OCR program streamlines the OCR process is to automatically identify blocks of text on a page. TypeReader's page-decomposition features match the competition's. You can tell the program to automatically locate text blocks, or you can designate blocks manually by enclosing them in a frame (see "Recognizing Text"). You can change the order in which TypeReader recognizes blocks, and if you routinely scan similarly formatted documents, you can create templates that describe the location of text zones. You can also specify that TypeReader treat text as snaking columns (newspaper-style) or as tabular columns.



Recognizing Text TypeReader's top-of-the-screen tool palette, called the Galley, is the gateway to the program's scanning, page-decomposition, and recognition features. The program's text-editing window, shown here, provides a pop-up verifier that lets you check recognized text against its scan. However, the text editor lacks common word processor features such as word wrap and the ability to access all installed fonts and sizes.

Recognizing and Editing

THE RECOGNITION PHASE IS THE MOST important step in any OCR job. It's when the OCR program applies a battery of complex shape-analysis techniques to identify the characters. In most of the tests run by Macworld Lab, TypeReader was more accurate than AccuText and ran neck and neck with OmniPage Professional (see "OCR Results"). It even did a respectable job on faxes. As for recognition speed, TypeReader was always faster than AccuText, and usually faster than OmniPage Professional.

TypeReader automatically retains character-formatting attributes such as boldface and italic. It even lets you assign a font to serif, sans serif, and monospaced (nonproportional) text. For example, you can tell the program to format all sans serif text in Helvetica, all serif text in Baskerville, and all monospaced text in Courier.

Like AccuText and OmniPage Professional, TypeReader recognizes text in the background under MultiFinder or System 7. TypeReader also provides a deferred-recognition option that enables you to scan a stack of pages but postpone recognition.

Unlike AccuText and OmniPage Professional, TypeReader does not provide a training feature—for teaching the program how to read a character that otherwise stumps it. As a result, TypeReader might not be the best choice for recognizing certain troublesome documents, such as those created on a typewriter with damaged keys.

TypeReader does provide an excellent spelling checker that also includes dictionaries for common geographical, legal, and medical terms. (Caere sells its medical and legal dictionaries separately.) Like AccuText and OmniPage Professional, TypeReader provides a pop-up verifier window that lets you compare a suspect word against a magnified version of the word as it appears in the scan.

Like OmniPage Professional, TypeReader provides a text-editing window that lets you read and polish recognized text before saving it. TypeReader's editing window falls short of OmniPage Pro's, however. There's no ruler for changing line spacing and indents, nor can you mix and match fonts and type sizes. (TypeReader limits you to just one serif or sans serif font.) Worse, there isn't even a standard word-wrap feature—a line simply gets longer or shorter as you add or remove text. TypeReader users will definitely want to use a separate word processor for fine-tuning.

As for exporting, TypeReader can save text in all popular formats, including Word, MacWrite, WordPerfect, WriteNow, RTF (rich text format), and Excel.

Where to Turn

OMNIPAGE PROFESSIONAL HAS SOME TALents that TypeReader lacks. One is support for System 7's publish and subscribe data-exchange mechanism; another is the ability to transmit recognized text directly to another program using System 7 Apple events. I don't consider either omission significant, since you can use text files or the Mac's Clipboard to move text from TypeReader into another program.

If you need training features, you should consider OmniPage Professional or AccuText. If you want glitzy System 7 data-exchange features or a text-editing window with more formatting features, go with OmniPage Professional. But if you want excellent speed and accuracy, thorough documentation and online help, and ease of use, check out TypeReader. But before you buy, try to visit a dealer that will let you audition a few programs using the types of documents you plan to scan. That's the best way to accurately determine how well a program will read what you throw at it.—JIM HEID

MW LAB OCR Results

All tests were performed using a Mac IIci with a cache card, 8MB of RAM, 32K RAM cache enabled, in black-and-white (1-bit) and in 32-bit modes.

	BASIC OFFICE DOCUMENTS			CHALLENGING DOCUMENTS		MULTICOLUMN DOCUMENTS	
	Laser-Printed	Typewritten	Dot-Matrix	Fax	Contract	Magazine	Newspaper
Average Scan Time (in seconds; shorter bars are better)	249 words	168 words	382 words	249 words	1402 words	552 words	927 words
ExperVision TypeReader 1.0	38	20	68	162	105	52	72
XEROX AccuText 3.0	45	31	101	206	195	140	152
Caere OmniPage Professional 2.0	31	26	85	226	81	58	71
Percent Accuracy (longer bars are better)							
ExperVision TypeReader 1.0	99.6	98.2	96.6	69.1	93.7	98.6	98.8
XEROX AccuText 3.0	98.0	95.2	93.7	14.1	94.4	95.7	96.2
Caere OmniPage Professional 2.0	98.8	100.0	97.4	22.1	81.9	99.6	98.2

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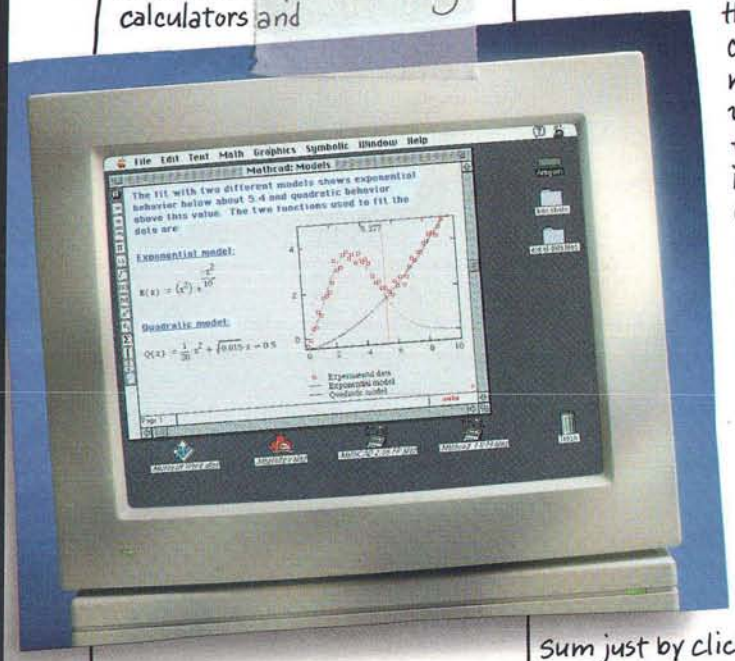

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Notebook Macs

PowerBook 145

PROS: Most inexpensive PowerBook; moderately fast processor. **CONS:** No built-in video port; limited RAM and hard drive expansion capability; RAM upgrade requires dealer installation; cannot be attached to a desktop Mac as a SCSI device. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $2149 to $2499.

MW ★★★

PowerBook 160

PROS: Built-in video port; moderately fast processor; sophisticated battery-management software; fairly large RAM expansion capability; provides 16 levels of gray. **CONS:** Limited hard drive capacity; video port is not standard Mac video port; RAM upgrade requires dealer installation. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $2429 to $3149.

MW ★★★★

PowerBook 180

PROS: Active matrix display; built-in video port; fast processor; sophisticated battery-management software; fairly large RAM expansion capability; provides 16 levels of gray. **CONS:** Limited hard drive capacity; video port is not standard Mac video port; RAM upgrade requires dealer installation. **COMPANY:** Apple Computer (408/996-1010). **LIST PRICE:** $4109 to $4469.

MW ★★★★

TWO OF APPLE'S THREE NEW NOTEbooks go a long way in making the PowerBook the all-in-one Mac. With the addition of video-out ports and the ability to have up to 14MB of RAM installed, the PowerBooks 160 and 180 have what it takes to do serious computing, both on the road and back at the office.

The new PowerBook 145 is an updated version of the discontinued 140. It's essentially the same machine, except that the CPU is a faster, 25MHz 68030, compared with the 140's 16MHz 030. Otherwise, it has the same limits as did the first-generation PowerBooks: memory expansion limited to 8MB, hard drive capacity limited to 80MB, no video-out port, and a black-and-white display. For occasional users—those who need a notebook only while traveling—the 145 has appeal as the lowest-cost PowerBook. But for most people, the few hundred dollars more for the 160 is a wiser investment.

The 160 and 180 are the notebooks of choice for most Macintosh users. (The 160 and 180 both replace the 170, offering the same or better processing speed but with more expansion options.) The essential differences between the 160 and 180 are in processing ability and in video-display quality. All their other features—software, interface, ports, and other hardware options—are identical.

Processing Power

FOR PROCESSING, THERE ARE TWO SIGNIFicant differences between the 160 and 180. First, the 180 has a faster processor: a 33MHz 68030, compared with the 160's 25MHz 030. Second, the 180 has a built-in 68882 math coprocessor; the 160 has no such coprocessor nor any option to add one later. Few business applications take advantage of the coprocessor, however, whereas the 180's faster processor will appeal to users running complex applications or working with large files.

Although the 180 is the fastest Apple notebook, it is not the fastest Mac notebook. Two other notebooks—the 33MHz 2030S and the 40MHz 2030V from Outbound Systems (303/786-9200)—surpass the 180's overall speed. But the Outbound notebooks—while more upgradable and faster than the Apple PowerBooks—don't have built-in video or support color display on external monitors, which are critical considerations if you intend to use a notebook with a standard monitor.

Expect Outbound's notebooks to remain the speed champs for some time, since the 68040 processor that would give Apple the speed edge is not available in a low-power-consuming version, and the regular 68040 takes so much power that a notebook wouldn't last more than about 45 minutes before draining the battery in everyday use. Motorola is rumored to be working on a low-power 68040, but until it is released, Mac notebooks will continue to be based on the 68030 processor.

Though the 030 processors in the 160 and 180 are sufficient for today's more complex applications, the ability to expand the RAM to 14MB is welcome. Just having System 7, one major application, plus a few INITs running can easily surpass the 4MB of RAM that's standard on most PowerBooks. Indeed, the review units I looked at all came with 4MB, and I constantly got messages telling me I was out of memory, even though I had only Excel plus Adobe Type Manager, or Fractal Design Painter alone, loaded. Make sure you get 8MB of RAM, whichever notebook you buy.

Display Differences

LIKE THE 145, THE 160 HAS A PASSIVE matrix display, which is adequate for on-and-off use but not for all-day use. The nature of passive matrix technology means you can expect to see ghosting, to have slow screen updating as you move elements, and to be limited in the angle at which you can view the display—if you get too far afield, the image starts to disappear. The 180's active matrix display, by contrast, can be viewed from nearly any angle and offers crisp images and fast refresh times. But that beautiful display adds about $1000 to the price. This is due to the nature of the technology used, not price-gouging on Apple's part. If a notebook is to be your main Mac, spend the extra money for the active matrix display—your eyes will thank you.

The 160 and 180 are the only Mac notebooks to offer gray-scale displays. The 16 levels of gray offered are inadequate if you expect to do detailed work with Photoshop or Fractal Design Painter or a page-layout program, but no liquid crystal display (LCD) currently available can provide the levels of gray an artist would need; but 16 levels are fine for previewing graphics. And for the many users who run nongraphics applications, the 16 levels provide a nicer display than a monochrome LCD (as in the 145) can. The shades of gray (actually, a steel blue) are pleasing to the eye and give the menus and folders and icons a soft, inviting touch, as "Display Comparison" shows.

The passive matrix and active matrix technologies do have an effect on the grays' display, however. On the 160's passive matrix LCD, the grays are muddier, the whitest white is not very white, and the blackest black is not very black. In photo-editing terms, the 160's grays cluster around the midtone values. By contrast, the 180's active matrix display shows very dark blacks and very light whites, but the midlevel grays are less subtle, and there is noticeable banding on images that have a full range of grays. Also, the contrast controls work differently on the passive matrix and active matrix screens—you get the best contrast on the 160 by placing the slider at its midpoint, while on the 180 you place the slider at the far left for best contrast.

You'll see many DOS notebook vendors advertising 64—or even more—levels of gray. By that yardstick, the Apple PowerBooks look to be downright dowdy. But there's less to those claims than meets the eye. LCD technology limits the numbers of grays (or colors) that the crystals can display. Many DOS notebooks advertise a higher number than their LCDs are really capable of—they either state the LCD's theoretical capabilities or the number of colors available from the note-

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book's palette, not the number that can be displayed simultaneously. By contrast, Apple is conservative in its claims of gray levels—a refreshing approach to marketing. (Of course, some DOS notebooks—particularly those from better-known vendors—can display more than 16 levels of gray, as many as 64.)

An important addition to the PowerBook 160 and 180 is built-in video support. You can now hook up an external monitor without an expensive adapter. The PowerBooks give you two modes in which to run the external monitor: normal dual-display mode; or mirroring mode, where the same image is shown on both screens. Mirroring is helpful if you are showing an audience step-by-step how to accomplish a task. (Use the PowerBook Display control panel to select mirroring mode.)

The external video is simple to enable: Plug the monitor into the adapter cable that comes with the PowerBook and restart the PowerBook. But be warned that the PowerBook must be plugged into an electrical outlet for the monitor to work. The PowerBook will not run an external monitor if it is using battery power, since the extra video processing needed to drive the external monitor consumes battery power quickly.

If you have a VGA monitor or LCD projection panel, you need a Mac-to-VGA adapter, which you can get from the monitor maker, an electronics supply store, or James Engineering (510/525-7350). However, not all adapters are alike. We tested three adapters, and two resulted in a purple cast over the entire screen. The third adapter gave us the true, unadulterated colors we expected.

When you have an external monitor connected, you'll notice that the screen seems to be shorter than a 14-inch monitor's standard 640-by-480-pixel screen when running in mirroring mode. Because of how LCDs are made, they are limited to 640-by-400-pixel screens, and since mirroring mode duplicates the LCD screen display, the result is 80 fewer pixels vertically on the external monitor. The effect on an external monitor is like watching a classic movie like *Lawrence of Arabia* in letterbox format on your TV.

In either mirroring mode or dual-monitor mode, the display quality meets Apple's usual high standards—the color (256 maximum on 16-inch and smaller monitors) is superb, and the screen refresh is quick.

Odds and Ends

APPLE HAS ADDED A FEW SUBTLE BUT nice touches to its 160 and 180. First, these PowerBooks support SCSI disk mode, which means you can attach them via a SCSI cable to another Mac and see their drives' contents as if they were standard SCSI devices. Sony designed that feature into the PowerBook 100 (all the Outbounds offer it as well), but these are the first (and only) Apple-designed notebooks to have it. This feature is not free—it costs $39 for the special SCSI connector needed. Still, it's a welcome addition, since it makes file transfer a snap. Too bad the 145 didn't add this feature.

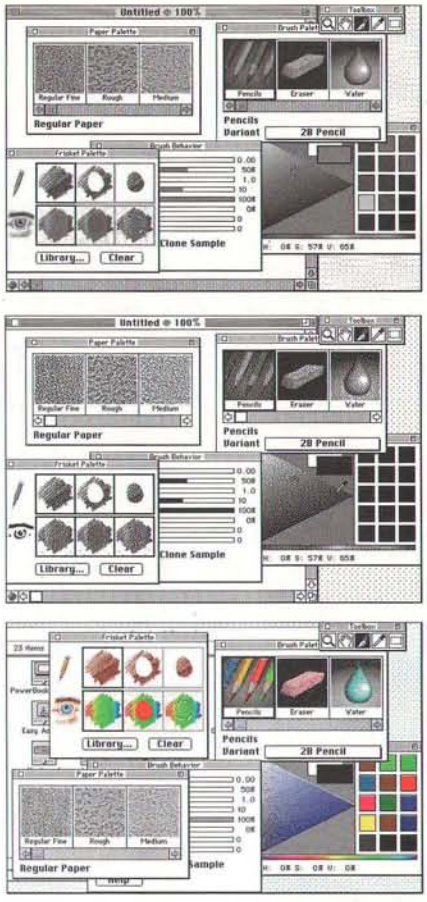
Apple has enhanced the battery-management software on the 160 and 180 to give you more options. One option is a slider bar in the PowerBook control panel that lets you determine the trade-off between battery life and overall performance. To increase battery life, you can make the hard drive spin down when inactive. Other options include dimming the screen after user-defined intervals of inactivity, and slowing down the processor to 16MHz (which is fine for text-oriented applications and moderately complex operations).

These options extend the life of the PowerBook's battery—which is important, since a PowerBook 160 or 180 has only enough power for about 45 to 50 minutes of continuous, full use, according to Macworld Lab's tests. The Macworld Lab tests use the screen at full brightness, with the dim option off, the power-to-conservation trade-off at 75 percent, and the hard drive constantly in use. For everyday usage patterns, this translates to about 1½ hours of usage.

Finally, Apple added a Kensington MicroSaver security device ($59.95, 415/572-2700) to the back panel. This device lets you lock your PowerBook to a chair or desk. The Kensington device is also found on several popular DOS notebooks, so it's likely this device will become a standard, making it easier to find extra security cables.

Usability Quibbles

DESPITE THE MANY WELCOME ADDITIONS in the PowerBook 160 and 180, I still quibble with some of the ergonomics choices Apple has made. I realize that the many chips on a Mac, compared with the fewer chips on a DOS computer, give Apple less flexibility in laying out the components in the notebook's cramped space, but I believe some better choices could have been made. After all, Outbound's notebooks offer more flexibility in the same confines. For example, the Outbound notebooks use standard SIMMs, and their RAM, hard drive, and even their processor are easily upgradable (even by a proficient user, not just by dealers).



Display Comparison The 16 levels of gray on a PowerBook 160's or 180's screen (top) make for a more appealing display than the other PowerBooks' black-and-white display (middle). When attached to an external monitor, the PowerBook 160 and 180 both can display an image in as many as 256 colors (bottom).

Other things on my wish list are implemented in better DOS notebooks but in no Mac notebooks. One request is that Apple use a standard Mac video port on its notebooks. The current port on the 160 and 180 requires an intermediate cable—basically an adapter—which is one more thing to lose. (The cable does have a locking mechanism, so at least it won't pull out of the PowerBook.) Also, the restart button is not easily accessible—it's behind the ports panel at the back of the notebook. A restart button near the keyboard would be much more convenient, and it could be designed to avoid risking accidental restarts.

The Apple keyboard could be improved. First, the keys are slightly too close together, making touch typists reorient their finger motions when moving to or from another Mac. DOS notebooks have the same keyboard spacing as DOS (and Mac) desktops, as do the Outbound notebooks. The PowerBooks' arrow keys are arranged in the unintuitive

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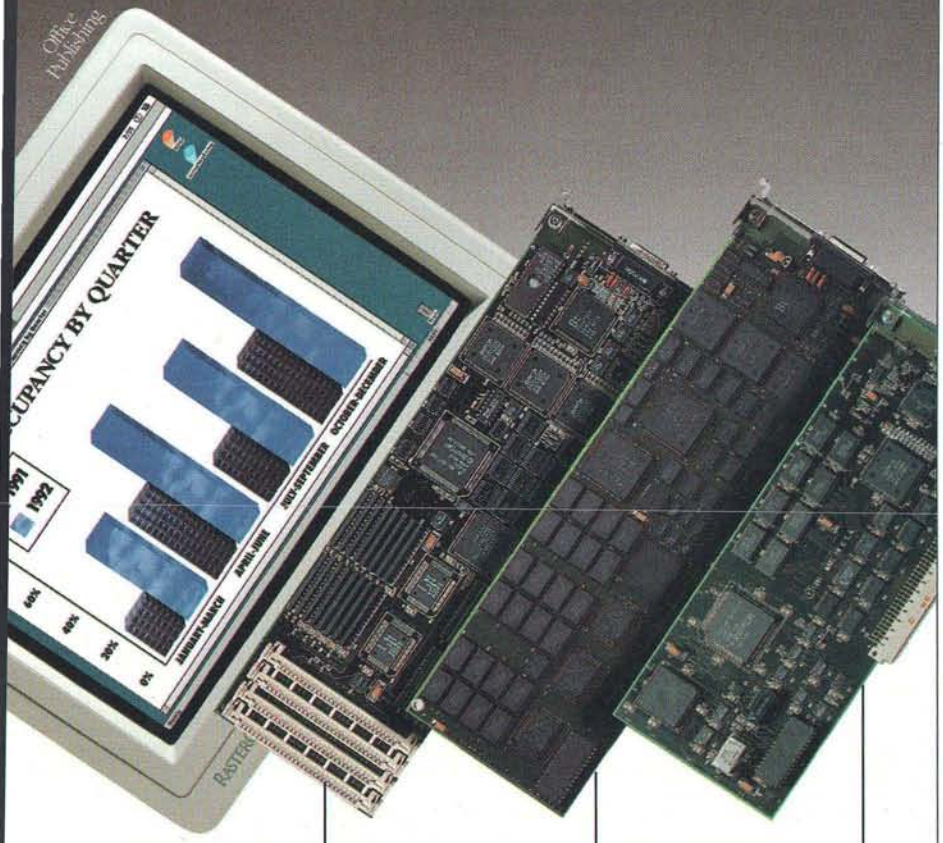

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horizontal arrangement of the original Mac keyboard. Please, follow the intuitive inverted-T design (where the up arrow is above the down arrow, and the left arrow is at the left and the right arrow is at the right). And add page up and page down keys—nothing is faster for scrolling through text files and spreadsheets.

The position of the floppy drive is inconvenient on airplane and train seat trays. Eject your floppy, and it hits the food tray of the person sitting next to you. On a cramped desk, it will likely push against an external drive, a stack of files, or other obstacle. The best DOS notebooks have the floppy eject from the front, where the worst that can happen is that it will fall in your lap.

How about adding status lights (again, like most DOS notebooks) so you know when caps lock is on, whether the battery is charging, if the power cord is plugged in, and what speed the processor is running at.

Last, Apple should follow other notebook leaders and add PCMCIA (Personal Computer Memory Card Industry Association) slots. Such slots let third-party vendors add memory, hard drives, modems, and other expansion options via small cards—about the size of a credit card folded in half. These slots are destined to become a standard, and the cards do not require dealer installation.

Despite these complaints, I like the new 160 and 180. They now have the connectivity and RAM capabilities a business user expects in a notebook, plus all the interface niceties that users expect in a Mac. A few improvements, and they'd be perfect.—GALEN GRUMAN

Presentation Software

Action 1.0

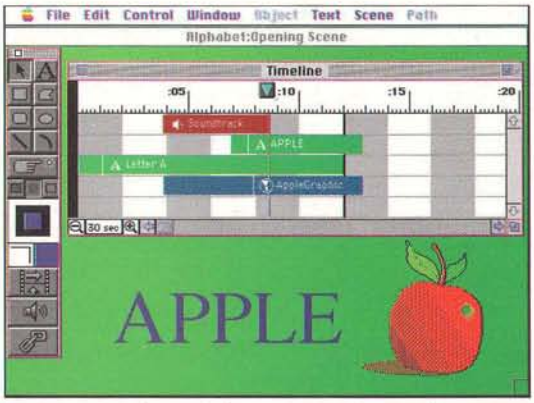
PROS: Broad variety of transitional effects; creates gradient and patterned backgrounds; includes basic drawing tools; templates included. **CONS:** Imports only PICT-format graphics; can't import text; playback degrades rapidly as presentations grow more complex; choppy performance on slower Macs. **COMPANY:** Macromedia (415/442-0200). **REQUIRES:** Mac LC; 4MB of RAM; System 6.0.7; 32-bit QuickDraw. Recommended: Mac IIci; 8MB of RAM; color monitor. **LIST PRICE:** $495.

MW ★★★★

CREATING A MULTIMEDIA PRODUCTION can be a daunting task, especially if you're using higher-end presentation software packages such as MacroMind Director and trying to combine numerous color graphics, digitized sounds, animations, and QuickTime movies.

Action, an entry-level multimedia-integration program from Macromedia, offers a less intimidating introduction to multimedia production. Action's straightforward interface makes turning out high-quality presentations with sound and motion a surprisingly easy process.

You start by importing graphics, movies, and sound objects you've created with other applications and positioning them against a backdrop in Action's main Presentation window. The backdrop—called the Stage—can be a solid color, an imported PICT graphic, or a two-color pattern or gradient created within Action. Imported sounds and images must be in one of five standard formats: AIFF, SoundEdit, PICT, PICS, or QuickTime movie.



Action's Timeline Window Bars on the time line give you second-by-second control over each object and event in a scene. Here, two text objects (one hidden behind the Timeline window), a PICT graphic, and a sound file, have been combined to create a 12-second scene.

Next you configure each graphic object's attributes through the Edit Object dialog box, including its entrance and exit time and the transitional effect that will be used to make it appear and vanish. Action offers an excellent variety of 30 transitions, such as Fine Dissolve, Checkerboard, and Horizontal Blinds. You can also instruct objects to enter from off screen or to travel along a path you define.

Action's button and linking features enable you to give viewers control over the flow of the presentation. You can designate any object to be a button and set it to perform a task such as Pause or Go to First Scene.

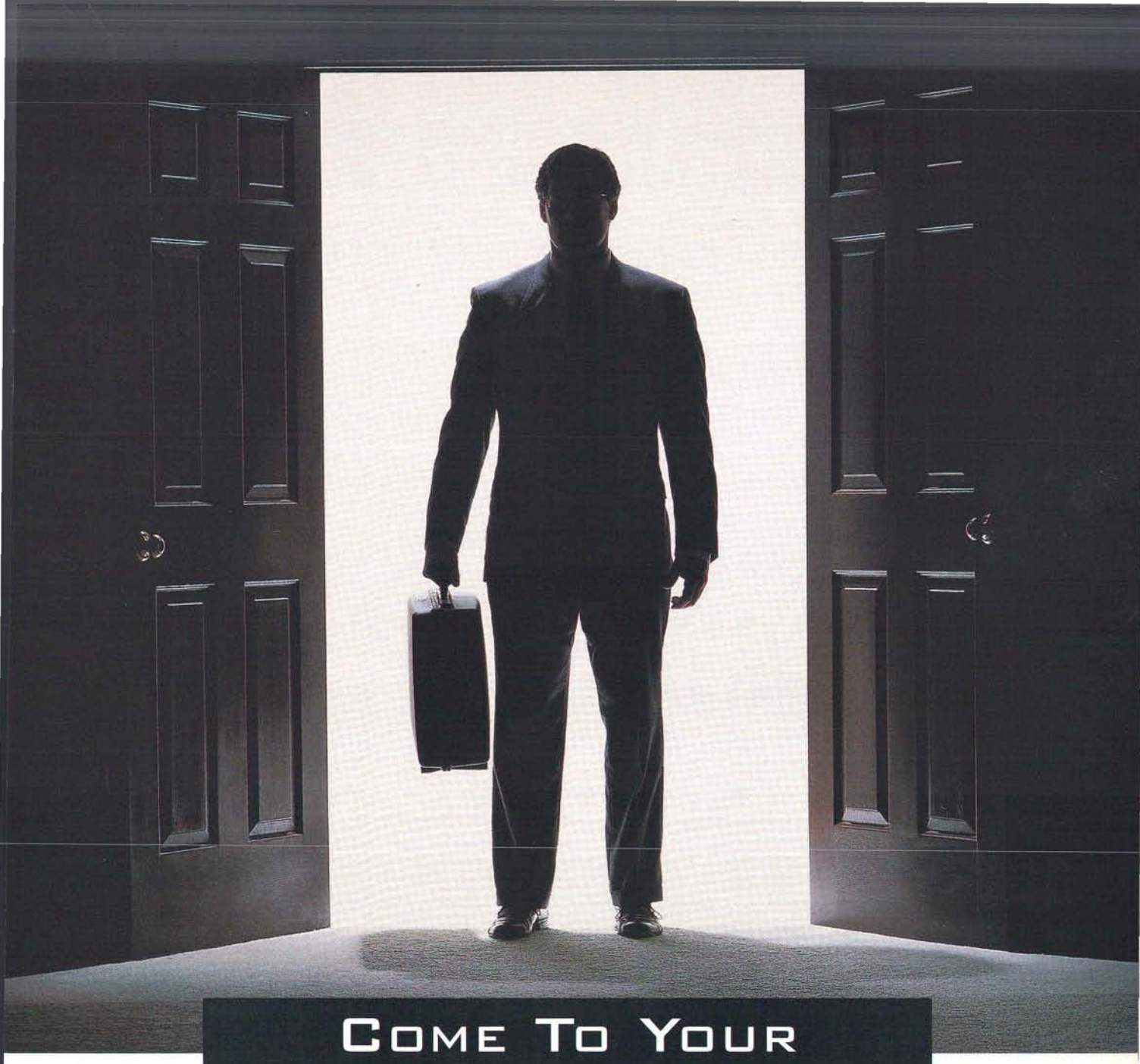
Though primarily designed to use objects created in other applications, Action provides a number of basic drawing tools to create circles, rectangles, polygons, lines, and arcs. There's also a text tool for adding formatted titles and other text to presentations. The text tool is not just a convenience, it's a necessity; you can't import text files into Action.

One of Action's best features is that it lets you view and edit your work-in-progress from several different standpoints. The Content List displays an inventory of all the objects and events making up each scene. Double-clicking on any object's name in the list gives you instant access to the object for editing. You can edit text objects from within the Content List simply by selecting the text and retyping. The Scene Sorter window displays a tiny image of each scene in the presentation and lets you rearrange the sequence by dragging scenes into a different order. In the Timeline window, each object in a scene is represented by a bar on a time line. You can lengthen, shorten, or drag the bars to change any object's entrance, exit, or duration within the scene.

All of this makes for extremely easy editing. But before attempting anything too fancy, you should know that Action—like any multimedia program—requires a fast Macintosh with plenty of memory. You need at least an LC with 2MB of RAM to run the program, and Macromedia recommends doubling the application's standard partition to 4MB and using at least a IIci with 8MB of RAM for best results. Even with that configuration, movies and transitional effects become choppy and uneven if you combine more than just a few transitions, sounds, and movies within a scene.

Once your production is complete, you have a variety of playback options. You can use the Run Presentation command for immediate full-screen playback. If you have a VCR and an RGB-to-NTSC video converter, you can use the program's Print to Video command to transfer presentations to videotape. Or distribute presentations to other Mac users along with the runtime player application, included with the program.

Macromedia promises that by using the program's well-designed templates you'll have your first presentation completed in 10 minutes. That's a bit too optimistic; it takes somewhat more practice to create polished presentations. But of the half-dozen multimedia-integration programs now available in the $300-to-$600 price range, Macromedia's Action gives you the richest selection of features and is one of the easiest to master.
—JOSEPH SCHORR.



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LCD PRESENTATION PRODUCTS

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3-D Rendering/Animation Package

ElectricImage Animation System 1.5.1

PROS: Vastly improved documentation; rendering capabilities include shadow casting, transparency and environmental mapping, and special lighting effects; intuitive project window lets you control all aspects of animation from single location. **CONS:** Expensive; hardware copy protection; no modeler; must convert models before importing. **COMPANY:** Electric Image (818/577-1627). **REQUIRES:** Mac II with math coprocessor; 8MB of RAM; 80MB hard drive; 1.4MB floppy drive; color monitor; System 6.0.8; 3-D modeling program. Recommended: Mac IIfx or Quadra; 32MB of RAM; 32-bit video board; System 7. **LIST PRICE:** $7495.

MW ★★★★

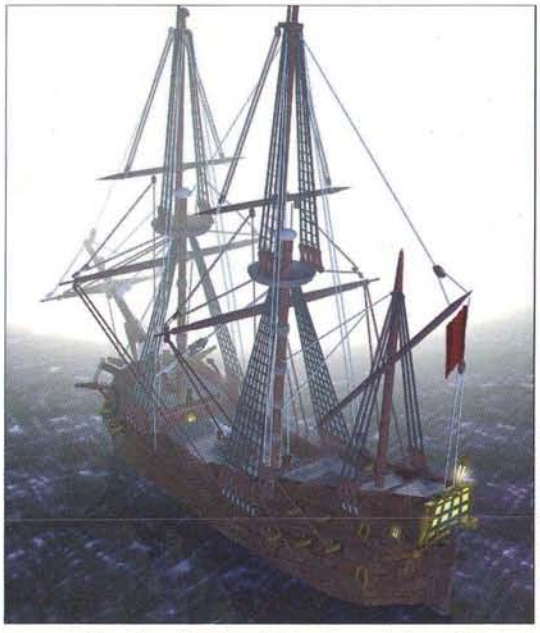
ELECTRICIMAGE IS THE KIND OF PROgram you'd expect to see on a shelf in Steven Spielberg's home on an episode of "Lifestyles of the Rich and Famous." It retails for the price of a European vacation for two, it lacks modeling capabilities, and it's copy-protected with a hardware device to discourage the riffraff. But ElectricImage is also the most powerful animation program available for the Mac. You've no doubt seen a few by-products of this fantastic application. Teenyboppers will recall the titles to "Beverly Hills 90210" and the fantastic creatures from MTV's Liquid Television hit "The Adventures of Thomas and Nardo." For the why-read-the-book-when-you-can-wait-for-the-movie crowd, there's the titles to Scott Turow's made-for-TV *Burden of Proof* and a whole slew of special effects for the upcoming big-budget Spielberg rendition of Michael Crichton's *Jurassic Park*. Other credits include the family of TV-heads for the "Nick at Nite" identification (see "1991 Macintosh Masters Showcase," *Macworld*, April 1992), the theatrical trailer for *Encino Man*, and the nuclear annihilation of downtown L.A. from *Terminator 2*.

Some of these fantastic sequences were created using the newest version of the program, ElectricImage 1.5.1. Free to registered users of previous versions—"This will be the only free upgrade we offer," warns a press release—the update ships with a substantially improved manual that offers a more comprehensive description of the product, better explanations of texture mapping and other complex topics, tips for rendering realistic surfaces, and a well-rounded introduction to the video-animation process. The index is awful, but otherwise the documentation is a phenomenal improvement over the previous effort.

The Beauty of the World

ELECTRICIMAGE 1.5.1 ENABLES YOU TO create extremely realistic environments for animated objects. For one, you can cast antialiased shadows using spot, radial, and parallel light sources. You can even shine many lights onto a single object to create overlapping shadows of different shades and colors. The manual recommends that your system be equipped with at least 32MB of RAM to cast shadows; and even then scenes with shadows take approximately 25 percent longer to render than scenes without shadows, but the difference is easily worth the wait. If you're short on time and memory, however, you can reduce the size of the shadow buffer, but you lose quality.

Version 1.5.1 has also improved on the program's transparency and reflection capabilities. The original ElectricImage was limited to 16 levels of opacity. As a surface became more transparent, highlights and reflections also faded, flattening the appearance of objects. The upgraded program offers 256 levels of opacity and maintains the intensity of reflections and highlights to enhance the perception of reality. Furthermore, you can increase the opacity of the edges of an object to make it appear hollow. (Hold an empty drinking glass up to the light and you'll see that it becomes less transparent around its edges.)



DANE SPANGLER AND TOM MIDGLEY

Soupy Sails The white haze drifting across the bow of the boat was created by combining a radial light source with the fog effect. The image also makes use of ElectricImage's shadowing (on the deck) and reflection (in the water) capabilities. The entire 1200-by-1400-pixel image took 7½ hours to render.

To imitate reflections, ElectricImage provides what it calls environmental mapping. Instead of performing ray tracing, which the documentation dismisses as unnecessarily time-consuming, ElectricImage wraps a 360-degree view of a scene around an object by projecting the reflection in six different directions—up, down, right, left, forward, and backward. Incidentally, this is an improvement over traditional reflection mapping, in which a scene is projected onto a model in only one direction. While the effect falls short of ray tracing, in which a program calculates the behavior of every single beam of light in a scene, environmental mapping is hundreds of times faster, requiring minutes instead of days to render.

ElectricImage adds two moody lighting effects—glow and fog—either of which would be perfectly at home in a bit of film noir. The glow effect surrounds a transparent light beam with a luster that fades outward from the beam to a specified depth. If you apply a glow to a spotlight, you get a searchlight effect. Apply a glow to the new tube light source—which produces a linear, laserlike beam of light—to achieve a neon effect. The fog effect is similar to the glow effect, but the light beam is opaque and sheds no light on the background, as if the light were inching its way through a pea-soup fog. Combined with a radial light, the fog effect lends itself to the bare-bulb-in-a-smoky-room effect, ideal when you want to render some dogs playing poker.

The Paragon of Animation

POSSIBLY THE BEST—AND CERTAINLY THE most intuitive—new feature is the project window, which enables you to control virtually every aspect of an animation from a central location. The project window lets you specify the movement of any light, camera, or object in the current scene with respect to key frames in the animated sequence, individual frames, or increments of time. You can even switch back and forth between different animation modes with no loss of accuracy; this encourages experimentation and enables you to fine-tune an animation from several different perspectives. You can also independently adjust specific attributes of an object, including position, rotation, scale, and color. If that's not enough, you

continues

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22002T

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can attach objects to each other so that if you move one object, the attached objects move in kind. For example, you might attach two spotlights to the front of a car to create headlights. Or, you can have two objects move independently while forever facing each other, like a spotlight following an actor on stage. These options and more are within easy reach from the project window.

But while this program is exceptional in many ways, I do occasionally wish for more. For example, ElectricImage provides no means for storing texture maps to a library. Though you can save textures and their settings to the Scrapbook, a library feature with texture palettes would be much more convenient. Furthermore, ElectricImage doesn't provide you with a link between a texture map and objects, meaning that you cannot edit a texture and automatically update objects mapped with that texture, as in Alias Sketch, StrataVision 3D, and half a dozen other programs. Finally, ElectricImage can only import models stored in its native Fact format. To bring in other models, you have to first convert them one at a time by using the laborious Transporter utility.

These minor complaints aside, ElectricImage Animation System 1.5.1 is a rare piece of software that blurs the borders between souped-up Macs and dedicated graphics workstations. You can argue that at $7500, this program is cheaper than the next-best alternative, which is to invest tens of thousands of dollars in Unix-based software like Alias or Wavefront. But if you're a typical student or graphic artist trying to convert your skills from traditional techniques to computer art, ElectricImage is quite simply out of your reach. ElectricImage does supply the occasional money-saving trick. For example, folks who want to render to videotape can write an animation file to an Exabyte tape-backup system in the Abekas A-60 format and then restore the file to an A-60 at a service bureau, thereby saving the $60,000 an Abekas machine would cost. And this is wonderful news for corporate users.—DEKE McCLELLAND

RICH FERNALLD, HALL HUTCHISON, AND MARK BEYER

Rendered Aghast Rich Fernalld achieved this traditional depth-of-field effect for his animated TV series "The Adventures of Thomas and Nardo" by rendering his "computer cutout" characters in several different passes and compositing the images in ElectricImage's Projector utility.

Portrait-Style Monitor

Power Portrait

PROS: User-configurable resolution; built-in QuickDraw acceleration. **CONS:** Incompatible with some software; SCSI ID and termination hard to change. **COMPANY:** Sigma Designs (510/770-0100). **REQUIRES:** Any Mac with built-in monitor and SCSI port. **LIST PRICE:** Platinum $899; granite $949.

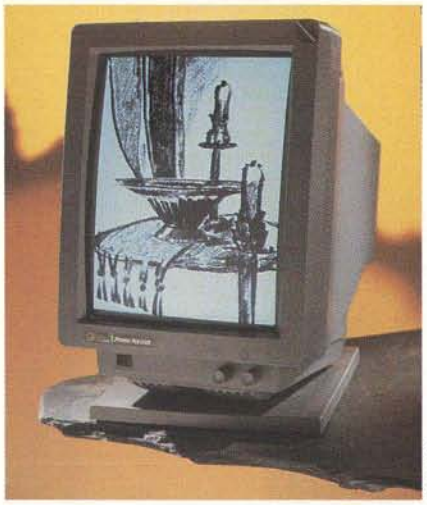
MW ★★★

THE POWER PORTRAIT IS A 15-INCH portrait-style monochrome display for Macs with built-in screens, like the Classic and PowerBook. Because these models lack provision for external monitors, the Power Portrait gets its signal from the Mac's SCSI port. The monitor has a tilt-and-swivel base and comes in both platinum and dark gray.

SCSI devices can be frustrating to set up, especially if you have more than one. Sigma provides external SCSI ID and termination controls, but they're not as convenient as they could be. To change the SCSI ID number, for example, you have to rotate a miniature dial that is recessed into the back of the monitor. I found it hard to see what I was doing. And to turn SCSI termination on or off, you have to press 24 tiny rocker switches. Still, it's better than cracking open the case.

The Power Portrait sports two 25-pin connectors instead of the more-common 50-pin connectors. If you have additional hardware, it's easiest to hook the Power Portrait directly to the Mac and daisy-chain other devices to the monitor. Although you can place the Power Portrait anywhere the SCSI cable reaches, Sigma recommends locating it to the right of the Mac to avoid the computer's power supply.

On Macs with the 68000 processor, you can use the Power Portrait by itself or alongside the Mac's internal screen; you set display options in Sigma's control panel (or cdev). On Macs with 68020 or 68030 processors, like the PowerBook, the internal display remains active, and you control the Power Portrait via the Monitors cdev. Either way, you can set the monitor's screen resolution to 72, 80, or 88 dots per inch, as well as turn hardware panning on and off. With panning enabled, the Power Portrait displays a small portion of a larger virtual screen of up to 1024 by 1024 pixels (about two 8½-by-11-inch pages side by side); hidden portions scroll into view when the cursor reaches the edge of the screen.



PAUL BERG

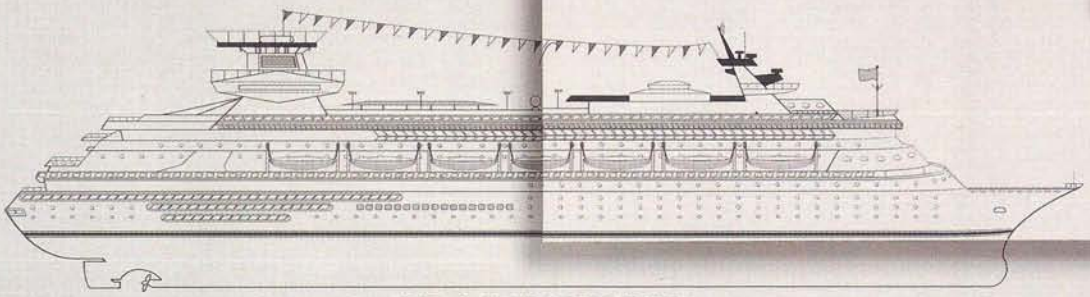
Power Portrait from Sigma Designs

Brightness and contrast are easy to adjust using knobs on the front of the monitor. Three dials at the rear let you tweak the position of the display on the CRT screen. Once I set the controls, text and graphics were crisp, and the background was adequately bright. Although I couldn't verify the claimed refresh rate of 97Hz, there was no noticeable flicker, and I worked with the Power Portrait for extended periods without eyestrain.

In the past, SCSI-based monitors have been criticized as being too poky to be practical. To overcome the SCSI bottleneck, Sigma incorporates QuickDraw acceleration into the Power Portrait's hardware. On average, display speed was similar to that of my PowerBook 170's built-in screen. However, the Power Portrait doesn't work with software that bypasses QuickDraw, including certain After Dark modules, many games, and HyperCard (Sigma's installer adds an XCMD to HyperCard to make it compatible). A Read Me file disk lists known incompatibilities and workarounds, but doesn't mention Aldus Persuasion, which had minor problems displaying graphics.

At first, I was skeptical about the value of an external display for my PowerBook. After a while, though, I began to appreciate the larger display area. The Power Portrait is also an acceptable option for users of compact Macs, like the Classic. Before you buy, though, check with Sigma to make sure that your software is compatible.—FRANKLIN N. TESSLER

DON'T MISS THE BOAT.



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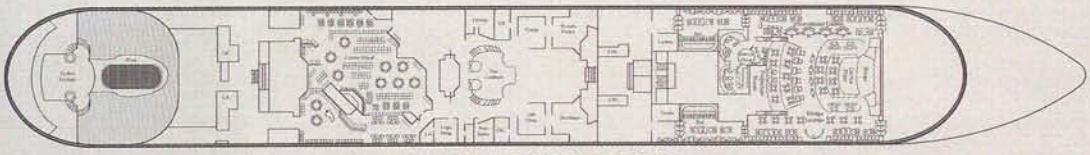

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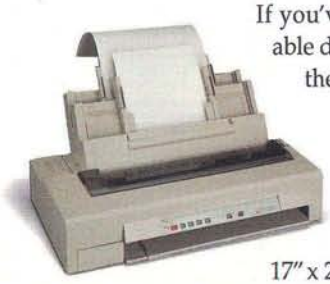

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PowerBook Video Adapters

PowerVision 1.31

PROS: Displays images quickly; supports multiple color levels; has excellent installation video and tools. **CONS:** Limited to smaller monitors; requires restart to change between mirroring and dual-display modes. **COMPANY:** Mirror Technologies (612/633-4450). **REQUIRES:** PowerBook 140, 145, or 170; System 7.0.1. **LIST PRICE:** With no RAM $499; with 2MB of RAM $699; with 4MB of RAM $999.

MW ★★★★

BookView Imperial

PROS: Displays images quickly; supports wide range of monitor sizes, as well as VGA monitors. **CONS:** Video-out port design is not sturdy. **COMPANY:** Computer Care (612/371-0061). **REQUIRES:** PowerBook 140, 145, or 170; System 7.0.1. **LIST PRICE:** $1399 (includes 6MB of RAM).

MW ★★★

OF THE TWO APPROACHES USED BY vendors to add external video ports to the first-generation PowerBooks—the 100, 140, 145, and 170—the better approach is the internal video adapter, which connects to the PowerBook's memory slot, since this type of adapter provides the fastest display possible on the second monitor. (The other approach is a slower SCSI video adapter, covered in "Expanding Your PowerBook," in this issue.) While the new PowerBook 160 and 180 have this video-out circuitry built in, there are more than 300,000 first-generation PowerBook owners who could benefit from a video adapter.

Two top choices for internal video adapters are Mirror Technologies' PowerVision and Computer Care's BookView Imperial. The trade-off between the two is monitor support: the PowerVision supports 12-inch and 14-inch color monitors, as well as 15-inch portrait gray-scale and black-and-white monitors, which covers most of the monitors people use every day. The BookView Imperial supports these plus 16-inch and 19-inch color monitors (at 8-bit color).

The PowerVision and BookView Imperial differ in other ways, too. The most striking is in their RAM configuration. The BookView Imperial comes with 6MB of RAM, which brings the PowerBook to its maximum of 8MB (the PowerBook 140, 145, and 170 come with 4MB of RAM, 2MB of which are soldered onto its logic board). By contrast, the PowerVision comes in three configurations: with 0MB, 2MB, or 4MB of RAM. Those who pick the 2MB version are generally limited to running one large application (such as Excel) and a few INITs, since System 7 and these applications take up a lot of RAM. The 4MB version brings the PowerBook up to 6MB, which is adequate for many users.

But business users will want a full 8MB (which requires 6MB of RAM on the PowerVision). They can get that RAM by adding a third-party 2MB RAM board onto the PowerVision's expansion connector, but Apple warns that such expansion approaches can cause trouble. If the combined dimensions of the stacked boards exceed the PowerBook's specifications, the boards could cause a short circuit. The BookView Imperial is a better choice for users who are concerned about this.

In either case, keep in mind that the video adapters reserve RAM for their own use. The BookView Imperial takes 2MB of system RAM, leaving just 6MB for the System and application. Computer Care promises that future versions of the BookView Imperial will let applications use some of this RAM when it's not needed for video processing. In contrast, the PowerVision has separate VRAM, so the memory that comes with the board is completely available for the System and applications. This makes the PowerVision a much less expensive product in terms of processing bang for the buck.

The PowerVision's video-out port is also sturdier than the BookView Imperial's. Instead of requiring an intermediate adapter to be attached between the video-out connector and the monitor's cable, as the BookView does, the PowerVision's video-out connector is a standard Mac adapter. This means there's one less thing to fall off or get lost.

For software, the BookView and PowerVision are more evenly matched. Both support the two types of display modes: mirroring, where the external and internal displays show the same image, and dual-display, where the two monitors make up one virtual screen (the standard Mac treatment of multiple monitors). And both require a restart to switch modes. The PowerView does not support virtual memory or Apple's RAM disk, while the BookView Imperial supports virtual memory but not the RAM disk. Computer Care has announced plans to include a shareware program called RAMDisk+ to address that need. And Mirror says it is now shipping a software upgrade to make the PowerVision compatible with both virtual memory and the RAM disk.

The two products are evenly matched in terms of video display speed. Macworld Lab tests showed that the two products performed within a few hundredths of a second of each other on all scroll and redisplay tests—a statistical tie.

But the PowerVision is easier to install. While installing a PowerVision voids your PowerBook warranty (and Mirror recommends you hire a dealer to install the PowerVision), Mirror provides a well-done installation video that a technically proficient person can follow. Plus, Mirror provides the hard-to-find Torx screwdrivers needed to open the PowerBook and install the PowerVision. There's even an antistatic wrist strap. A lot of care and thought went into the installation package, and it shows.

The BookView Imperial is the better bet if you intend to use a 16-inch or 19-inch monitor. But for the vast majority of users, who use 14-inch monitors, it's basically a tie. You'll have to decide whether the RAM options and slight differences in software give one product the nod over the other for your needs.

—GALEN GRUMAN AND MARK HURLOW

Small-Business Accounting

Business Sense 1.6

PROS: All-in-one program; uses double-entry bookkeeping method; includes training videos. **CONS:** Payroll tax tables should be simplified; documentation needs to be reorganized. **COMPANY:** Business Sense (801/963-1385). **REQUIRES:** Mac Plus; hard drive; System 6.0.7. **LIST PRICE:** $199.

MW ★★

IF LONGEVITY IS ANY INDICATOR OF success, Business Sense is successful. I first encountered the program in 1987 when it was called Turbo Mac Accounting, published by Digital, Etc. At the time it impressed me as a fairly competent accounting package. Business Sense, the program's new publisher, has updated the code to make the application run faster under System 7. Business Sense is still a competent program, with a reasonable $199 price and a one-year money-back guarantee. The company also includes two video training tapes on how to use the program, free with Business Sense.

Business Sense 1.6 uses conventional electronic versions of double-entry paper forms. It is a comprehensive all-in-one package offering general ledger (G/L), accounts payable (A/P), accounts receivable (A/R), and payroll.

continues

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22002R

Although it has no inventory module, the application accepts data from a separate product called ShopKeeper (from ShopKeeper Software). If you run a service business, you can also import data from the Timeslips application (from TimeSlips Corporation), for billing purposes. Business Sense imports and exports data in text or tab-delimited format; and the Claris XTND translator, for moving text into MacWrite and MacWrite II, is included.

Business Sense's Chart Of Accounts is numeric (you must identify departments by numbers, not names), and like that of most accounting packages, includes budgeting capabilities. It enables you to create separate departments as profit centers or job-tracking units, and lets you budget for these groups separately. Business Sense allows for 2000 customer accounts and 1500 vendors; the payroll function handles 100 employees with up to 10 withholding categories, plus tips and fringe benefits.

The program also provides all the standard reports needed in small businesses (trial balance, income statement, balance sheet, and so on), with many reports available in graphic format. The A/R module warns you when you approach your credit limit, calculates and applies finance charges and discounts, handles partial payments, and tracks sales commissions by customer. The A/P module tracks bills by invoice date, due date, and discount date, and automatically applies vendor discounts based on the information you enter when you set up your vendor list.

Business Sense keeps the books open for a whole business year, which some bookkeepers see as an advantage; others don't like this feature because you can change a previous month's data reports after the fact.

Business Sense works from a simple main screen, with menus for functions, accounting activities, and reports (see "Business Sense Main Screen"). Assuming you haven't rearranged the icons, you set up books using the icons in the first two rows on the main screen: Company Info, where you enter information about your company (name, address, and federal ID number, for example); Chart Of Accounts; Customers; Vendors; Departments, if any; Employees; Tax Tables; and Recurring Entries (those that occur every month). The setup process is covered in detail, occupying approximately half of the user manual. The main screen also has a Help icon and an icon for making entries in the General Journal.

Most of the actual bookkeeping entries are made in the bottom row of icons: Sales/AR, where you enter your sales; Purchases/AP, for purchases; and two Checking icons (one for making deposits and one for writing checks). For these processes Business Sense uses standard double-entry forms familiar to people who have worked with manual business books and ledger cards.

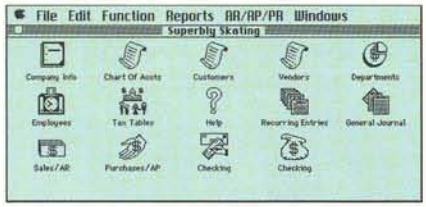
All A/P, A/R, disbursement, and deposit entries are basically made the same way, directly into the ledgers' (the General Journal) double-entry format. For example, to handle a payables purchase, you make one entry crediting A/P and a second, balancing, entry debiting the category of the purchase, such as rent.

To assist you in these entries, the Chart Of Accounts, Vendors, and Customers modules all contain a Transfer button that lets you automatically move a selected item onto your ledger form. For the payables purchase, for example, you open Vendors, scroll through the list, select the vendor you want, and click on the Transfer button—that vendor name and number is automatically copied onto the ledger sheet. You then open the Chart Of Accounts, click on the expense category (rent), then click on Transfer, and the balancing entry appears on the next line in the ledger as a rent expense.

Of course, the program doesn't let you close the ledger if information is missing or the entries don't balance. You must either complete the entry or select Line Delete from the Edit menu to remove unbalanced entries.

As a general rule, data entry is much easier in other all-in-one packages, such as Teleware's M.Y.O.B., Peachtree Accounting for Macintosh (formerly at-Once), CheckMark's MultiLedger and Payroll, and Softsync's Accountant, Inc. The file-cabinet metaphor and work-flow diagrams in M.Y.O.B., and CheckMark's logically ordered menus, are much easier to work with than Business Sense. Also, the competitive all-in-one packages use windows with scroll boxes to automate data entry, rather than making you manually open vendor lists or charts of accounts. The other packages also hide the double-entry ledger sheets, so you don't have to be concerned with balancing debits and credits, except when you make General Journal entries.

The Business Sense payroll function, like that of virtually all other products, requires that you enter a Social Security number, address, telephone number, and the hours worked directly into each employee record. CheckMark's payroll function is the only exception, giving you a separate screen for entering all employee hours. If employees have variable hours each period, such as in a small retail store or service business, the CheckMark approach makes entry of these hours much easier.



Business Sense Main Screen When the application opens, the user chooses the appropriate entry journal by clicking on a main window icon. The menu bar provides the standard File and Edit, plus menus for functions, accounting procedures, and reports.

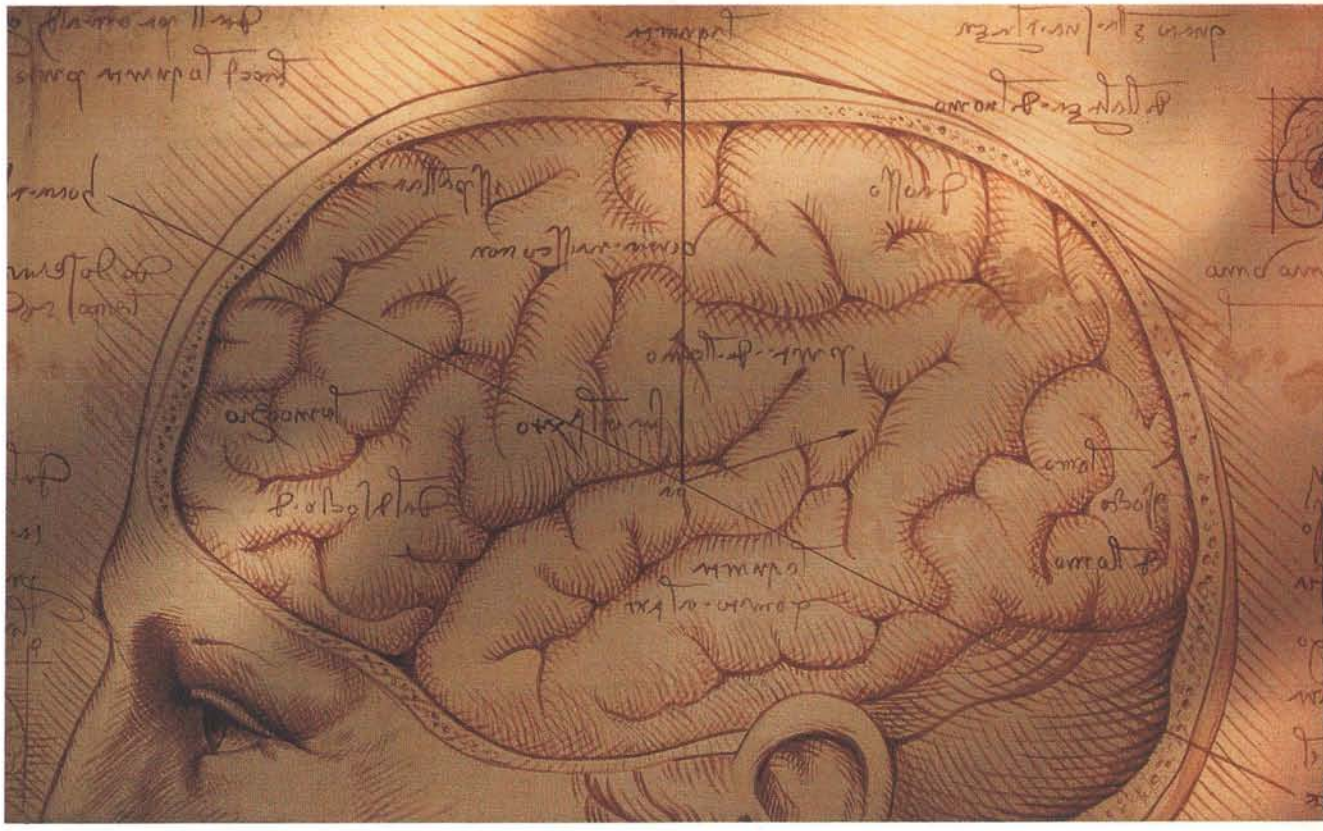
M.Y.O.B. differs from Business Sense by not offering a payroll segment; and CheckMark and Accountant cost more because they have integrated Inventory modules not included in Business Sense.

In terms of competition, Business Sense goes head-to-head with the Peachtree package, and Peachtree's Mac interface and data entry are better.

Business Sense's main fault, however, lies in its payroll tax tables. The program would be much improved by using annualized tables rather than separate detailed listings for Single/Married, Weekly, Biweekly, Semimonthly, and Monthly. Although you can update these tables yourself, it takes a massive amount of time (not to mention disk space) if you have different pay periods. You will probably want to buy the federal tables that Business Sense makes available each year. The company does not, however, sell state tax tables (except for California), so you could have quite a job revising your state tables each year. Peachtree does not allow you to update its tables in any way, thus forcing you to purchase them each year. But at least it sells both federal and state tables.

Business Sense uses the previous version's documentation with an addendum. While it does a good job of guiding you through setup, the manual could have more details and continuity, especially in describing the processes of entering payables and receivables. The documentation needs to be reorganized to match the actual work processes performed by the user.

Business Sense is a competent, single-user all-in-one bookkeeping program—adequate for keeping the books for a small company. It is not as easy to use as its most direct competitor, Peachtree Accounting for Macintosh, but if Business Sense would simplify the tax tables and reorganize the manual, it would be a much more formidable competitor.—ALAN SLAY



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MW ★★★

LASER PRINTERS ARE FAST AND QUIET, and they produce sharp copy; but they don't think big. Most lasers are limited to a maximum page size of 8.5 by 14 inches (legal size), with a few supporting 11-by-17-inch (ledger-size) stock.

These page sizes are fine for most correspondence and publishing tasks, but they're too small for many applications. Larger page sizes work best for architectural drawings, circuit diagrams, and technical illustrations. The preferred device for these jobs has traditionally been the pen plotter, which zips special felt-tip pens across a sheet of paper. Plotters are ideal for line art, but they don't handle gray shades or text well.

Publishers who produce tabloid-size publications often prefer to proof two-page spreads, which require a 17-by-22-inch sheet. To print large page sizes, most publishers resort to their page-layout programs' *tiling* feature, which divides large pages into smaller sheets that are then taped together—not exactly cutting-edge.

The GCC WideWriter 360 printer provides large-format output in a reasonably priced package. The WideWriter 360 uses a Canon-built ink-jet print mechanism that's conceptually similar to that of Apple's StyleWriter ink-jet printer. Like a StyleWriter, the WideWriter provides print resolution of 360 dpi and uses a disposable ink cartridge.

But a StyleWriter is limited to legal-size sheets; a WideWriter 360 can automatically feed sheets as large as 14 by 91 inches. Using the manual-feed slot, you can print sheets up to 17 inches wide, with no length limitation. You can also load the WideWriter with continuous-feed fanfold paper to print ultrawide spreadsheets or Texas-size banners. The WideWriter may be the ultimate banner-printing machine.

Big Output, Small Package

THE WIDEWRITER 360 MAY THINK BIG, but it isn't big. The printer measures 5.4 inches high, 23.3 inches wide, and 14.9 inches deep. With the included sheet feeder attached, the WideWriter weighs less than 25 pounds. The printer is easy to set up: remove the packing tape that secures its plastic lids, unlock the print head, and slide the sheet feeder home.

The WideWriter 360's single rear-panel connector has a dual personality. Attach the included cable to the Mac's modem or printer port, and you have a fast, serial connection like that used by an Apple ImageWriter II, StyleWriter, or Personal LaserWriter LS. Attach a LocalTalk or PhoneNet network connector instead, and you can share the WideWriter among numerous Macs. When switched on, the printer senses which connection scheme you've used and configures itself appropriately.

Every printer needs driver software, which translates the generic printing commands all Mac programs use into the commands required by a specific printer. The WideWriter's driver is based on the one used by GCC's Personal LaserPrinter series, WriteMove II portable ink-jet printer, and ColorFast film recorder. The advantage of this family resemblance is reliability and compatibility; the PLP driver technology has been around since 1987. The disadvantage is that it doesn't support PostScript, so you can't print illustrations from PostScript draw programs such as Aldus FreeHand or Adobe Illustrator. If you're willing to go through a two-step printing routine, however, you can get PostScript output by using TeleTypesetting Company's (617/734-9700) T-Script Deluxe PostScript-emulation software. Another popular PostScript emulator, Freedom of Press from ColorAge (formerly Custom Applications), does not support the WideWriter. The WideWriter includes the Adobe Type Manager utility and 21 Type 1 fonts. TrueType fonts work fine, too.

The WideWriter 360 driver provides High, Medium, and Draft print-quality settings; the latter two produce faster output and use less ink than the first. You also get some convenience options that even Apple's drivers don't provide, including detailed online help, a Preview button that lets you see how a document will appear before printing, the ability to specify up to 15 custom page-sizes, and an edge-to-edge printing option that lets you print to the edges of the page (print quality degrades a bit at the edges). The driver also supports background printing under MultiFinder or System 7.

GCC sells a second sheet feeder for $149 that lets you mix and match paper sizes. The WideWriter Print dialog box lets you print the first page of a document from one feeder and subsequent pages from the other.

It's No Laser Printer

THE WIDEWRITER'S OUTPUT QUALITY is excellent, but it still isn't in the laser printer league (see "WideWriter 360 Close-Up"). Character edges have a slightly fuzzy appearance, especially if you use cheap bond paper. (GCC recommends a minimum cotton content of 25 percent.) Moreover, the WideWriter's ink is water soluble—take a WideWriter blueprint out in the rain, and it's likely to smear. (You can work around this by photocopying the output.) The WideWriter is no speed demon, either, but it is faster than most pen plotters.

If the WideWriter 360 sounds appealing but a bit pricey, you might consider combining Canon's DOS PC–oriented BJ-330 ink-jet printer with GDT Softwork's driver-and-cable package, PowerPrint. The Canon BJ-330 uses the same print mechanism as the WideWriter and often discounts for about $700, including a sheet feeder. The combination isn't as elegant as the WideWriter—PowerPrint can't compare to GCC's driver—but does cost considerably less.

The WideWriter 360 isn't for everybody. Publishers who want to produce camera-ready tabloid output will be better served by a laser printer such as the QMS-PS 1700 or 860 (see "Workgroup Printers," *Macworld*, January 1993). And anyone who needs large-format color output for drafting will want to stick with pen plotters. But for proofing large-format publications or printing black-and-white architectural or technical drawings—and for banner buffs—the WideWriter is an excellent choice.
—JIM HEID

The quick brown fox jumped
The quick brown fox jumped

WideWriter 360 Close-Up The 360-dpi WideWriter's output (top) is very good, but it still falls short of 300-dpi laser printer output (bottom). Note the somewhat jagged character edges caused by ink seeping into the paper's fibers as it dries.

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Contact Manager

ACT for Macintosh 1.0

PROS: Customizable contact fields; macros; multiple contact views; integrated word processor. **CONS:** Reference manual difficult to use; fixed-size windows; application must be running for alarms to appear. **REQUIRES:** Mac Classic; 2MB of RAM (4MB with System 7); hard drive; System 6.0.4. **COMPANY:** Contact Software International (214/919-9500). **LIST PRICE:** $395.

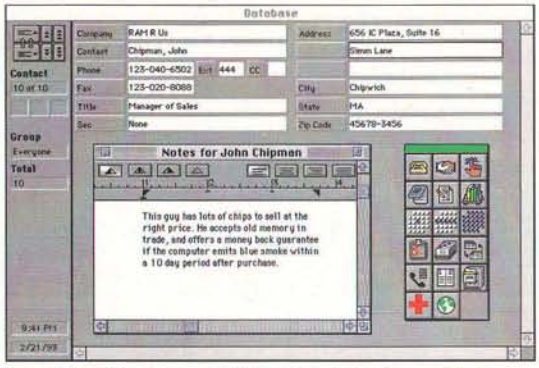
MW ★★

ACT FOR MACINTOSH—ONE OF THE newest business applications to make the transition from the PC world to the Macintosh—is a contact manager that combines an extensive personnel database with scheduling and word processing modules. But while ACT provides some features not found in competing products, the poorly conceived reference manual makes learning ACT a frustrating experience.

With more than 70 customizable fields, ACT's contact manager is more comprehensive than most Macintosh address books (see "Keeping in Contact"). In addition to changing a field's on-screen labels, you can lock a field to prevent users from entering data into it or you can conceal a field from view. You can set up a field to accept any text, or you can restrict the field to accept only dates, times, numbers, dollar amounts, or phone numbers. ACT formats telephone numbers automatically as you enter them, and an autodial feature lets you dial calls through a modem.

ACT incorporates several other features that are designed to cut down on keystrokes when you're entering contact information. You can specify default values for any field, and you can define sets of alternative entries (which Contact Software calls Pick Lists) to use for entering data into fields whose contents are limited to certain values. For fields that store coded information like state abbreviations, the Pick List can display both expanded and shorthand versions for each entry. If you're using System 7, you can program balloon help to prompt users during data entry. Finally, ACT's macro facility lets you record sequences of frequently repeated actions (including typing and mouse clicks) for later replay.

ACT provides 18 different views for displaying contact information, accessible from the View menu. Although ACT's default layouts should be adequate for most users, it would be nice if you could customize the position, order, and font of contact fields. Controls at the top left corner of the contact-view window enable you to browse the database one record at a time (either forward or backward) or jump directly to the first or last entry. ACT also includes a tabular list view, which displays all the records in the contact database. The list view lets you tag selected contacts, but it doesn't let you delete items.



Keeping in Contact ACT for Macintosh lets you attach notes of unlimited length to records in the contact database. A customizable tool palette provides access to ACT's major functions.

Search capabilities in ACT are more than adequate. Menu commands let you find records based on a single attribute (name or company, for example). To perform more-detailed searches, ACT's Query module lets you enter lookup criteria on a screen that resembles the standard contact view. You can also program complex searches by typing the field names and values you're looking for into a special window, an option that users with a flair for programming might prefer. The ability to add frequently used queries to the Lookup menu by saving them in a special folder is useful, but it's not as simple as customizing menu commands in Microsoft Word.

Because ACT's scheduling functions are centered around its contact manager, you have to associate activities with a particular contact or group of contacts, which is an annoyance if you want to book an event that doesn't involve anyone but you. (You can get around this restriction by associating an event with your own contact record.) To schedule a new activity, you enter the date, time, duration,and a brief description, and then choose the type of event (meeting, phone call, or to-do item) and priority (high, medium, or low) from pop-up menus. Strangely, ACT's scheduling dialog box accepts invalid times and dates without complaint (99999 is interpreted as 8 a.m., for example).

Unlike After Hours Software's DateBook, ACT cannot calculate an event's duration from the beginning and ending times. However, ACT does flag schedule conflicts, giving you the choice of accepting or rescheduling them. You can also schedule "timeless" activities, such as items on a to-do list that have no starting time or length. You can schedule recurring events, although this doesn't work as flexibly as in DateBook. You also can set an alarm to remind yourself of an upcoming event, but the alarm appears on your monitor only if ACT is running in the foreground.

ACT lets you view your schedule in daily, weekly, or monthly format. You can turn off display of timeless activities in the day and week views to make extra room for scheduled events. The monthly calendar shows the names of contacts associated with each day's events; clicking on a date brings up a complete list of that day's calls, meetings, and to-dos. Alas, all three schedule windows are fixed-size, so you can't adjust them to fit your monitor. And their modal design prevents you from toggling between the contact and schedule views.

ACT's word processing module sports all the usual functions, including a spelling checker, and you can import and export documents using the supplied Claris XTND file-translation filters. Unfortunately, the word processor is relatively poky at scrolling through long documents. When you create a new document, you can base it on a template that specifies which contact fields to incorporate. ACT ships with templates for letters, fax cover sheets, and envelopes, and you can supplement these with your own new templates. Templates can be programmed to ask whether to import data from a single contact or a group of contacts, a handy way of sending a memo to several people at once.

Although most Macintosh users dislike reading manuals, old hands have learned to appreciate a manual's role in revealing the fine points of a program. Unfortunately, ACT's *User's Guide*, although well organized, doesn't go far enough. Many important features are covered only in the abysmal *Reference Guide* that is organized alphabetically rather than by function—even patient readers are sure to be frustrated by numerous cross-references. ACT for Macintosh has several laudable features, but I'm afraid that its poor documentation and a few rough edges prevent me from awarding it a higher rating.

—FRANKLIN N. TESSLER

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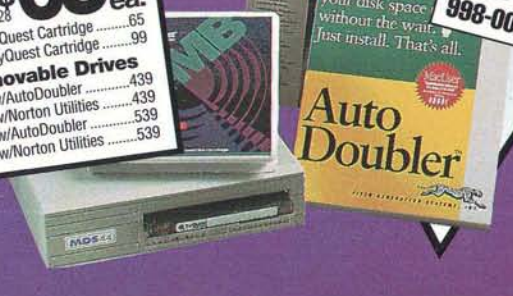

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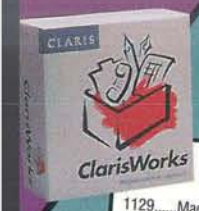

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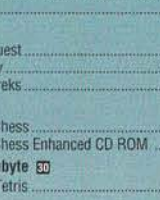

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VAMO

Integrated Software

Microsoft Works 3.0

PROS: Easy to learn and use; good manual and help system. **CONS:** Sluggish performance, especially on 68000 Macs; mediocre integration between modules; some bugs. **COMPANY:** Microsoft Corporation (206/882-8088).
REQUIRES: Mac Plus; modem; System 6.0.5.
LIST PRICE: $249.

MW ★★★

FOR YEARS, MICROSOFT WORKS WAS the dominant integrated-software package for the Mac, chiefly because Works was the only major integrated package available. After version 2.0 was released in 1988, the program's development languished, with only minor maintenance releases in the next four years. Serious competition for Microsoft Works arrived in 1991 from Symantec's GreatWorks and Claris's ClarisWorks, prompting many users to switch. Finally, a completely rewritten Microsoft Works has arrived, and while longtime loyalists aren't likely to desert the ship, the new Microsoft Works probably won't make many new converts. Works 3.0 has significant performance problems and some bugs, and it falls short of ClarisWorks and GreatWorks in integration between modules (see "All-in-One Programs," *Macworld*, June 1992).

Microsoft Works 3.0 consists of five modules: word processor, database, spreadsheet with chart, draw, and telecommunications. The draw module is new; previously, drawing tools were a part of the word processing module. The program's interface has undergone a welcome face-lift; under System 7 it sports an attractive 3-D look. Each module now has a floating tool palette that lets you use the mouse to accomplish many tasks. There is a good help system, and balloon help is also available. Other System 7 features supported include TrueType fonts and the Apple Communications Toolbox, and Microsoft says the program is 32-bit clean. Works doesn't support publish and subscribe or Apple events.

Installing Microsoft Works is easy; an included installer program copies Works and installs system resources as needed. A small annoyance for people with more than one hard drive is that the installer requires that you put the program on your start-up drive. A complete installation, with dictionaries, help files, and sample documents, requires almost 5MB of hard drive space. I tested Works using the program's 1MB default memory partition.

Microsoft Works 3.0 is immediately familiar to users of previous versions. Although the program has several new features, there are fewer than might be expected for an update that was four years in the making. The new version has improved headers and footers for all documents; better support for color, with a new 256-color palette; and better internal memory management, which allows you to have more windows open simultaneously. And if you use Microsoft Mail, you can use Works to send and receive E-mail messages. The word processor now supports footnotes and endnotes; improved mail merge; and a better spelling checker and thesaurus. Unfortunately, you can't convert custom user dictionaries from the 2.0 version, which I think is a major oversight.

The database allows you to name and save record-selection criteria, save up to 16 forms, and print labels and envelopes from within the database. In the spreadsheet module, charts are now a layer over the spreadsheet, rather than a separate document. The new draw module includes linked text columns for desktop publishing, object rotation, and automatic 3-D and shadow effects. The completely new telecommunications module is based on Apple's Communications Toolbox and has the usual dialog boxes for modem speed, setup, and file-transfers. File-transfer protocols include Xmodem and Kermit; there are no Ymodem or Zmodem tools available from Microsoft, although such tools are available at extra cost from Seaquest Software (503/531-0252). The phone numbers and settings for each BBS or online service you call are saved in a separate communications document. You can record a series of keystrokes and responses, and store them as an automatic log-on sequence. You can also use Works' macro feature to automate other online actions. An on-screen status bar can tell you how long you've been online or how much the session is costing you in online charges. The telecommunications module is adequate, although I'd like to see a Zmodem tool included with the program.

Drawing a Newsletter Works 3.0's expanded drawing capabilities allow improved control over color and linked text columns, as shown here. Note the floating tool palette, which lets you easily set font attributes, and contains the drawing tools.

Microsoft Works uses file-translation technology from DataViz, maker of the MacLinkPlus translation package. In addition to the file translators included with Works, you can buy translators from DataViz that will translate files from a wide range of Mac, Windows, and DOS programs to and from Works. While Microsoft includes a selection of translators, it doesn't include translators for Microsoft Word 3.0, or for Excel 4.0 for the Mac. There are, however, workarounds for both of these.

Works 3.0 is easy to learn and use. The tutorial supplied with the program steps you through basic document creation, and the manual is adequate. The word processor, which is the heart of any integrated program, can easily handle most business correspondence. You probably shouldn't try to write a book with Works, but it should be fine for most writing projects. The same goes for the spreadsheet and database modules; they're capable, but not spectacular.

Microsoft Works 3.0 has a number of bugs and problems, ranging from incompatibilities with common third-party extensions, to odd design choices, to outright crashes. The program is incompatible with and crashes with Super Boomerang, part of the popular Now Utilities package from Now Software. I experienced other occasional, unexplained bombs, even when I had all extensions turned off. In the database module, ⌘-L previously toggled between the List view and the Data view; now it goes to the List view and stays there. The database also deals oddly with reports—for example, if you make a character change (font, style, or size) in a report, that same change is reflected in the List view (and vice versa). This doesn't make much sense, as part of the idea of being able to save different report formats is being able to customize reports for different purposes. These changes, among others, have brought complaints from several users on the online networks.

Performance in Works also needs some improvement. Scrolling was very slow in the draw mode, running on an

continues

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Circle 43 on reader service card

SE/30 in 8-bit color and a color monitor. The database module is slower in some find and sort operations than in Works 2.0, although to be fair, saving a database is much faster in version 3. People with 68000-based Macs, such as a Mac Plus or Classic, may be better off to stick with Works 2.0e until Microsoft improves the new version.

With Works 3.0, Microsoft delivers marginally improved functionality to a large installed base of users. The problem is that the world has changed in the past four years; Works is no longer the only kid on the block. ClarisWorks and GreatWorks take fresh approaches to the integrated-software problem and deliver more capability for the same price. I recommend Works 3.0 for longtime Works 2.0 users who have many documents in the old version; it would be difficult for these users to make the switch to a new product. But if you're shopping for an integrated package for the first time, you should take a look at the other packages before you write a check.—TOM NEGRINO

Intelligent Agent-Based Utility

Magnet 1.0

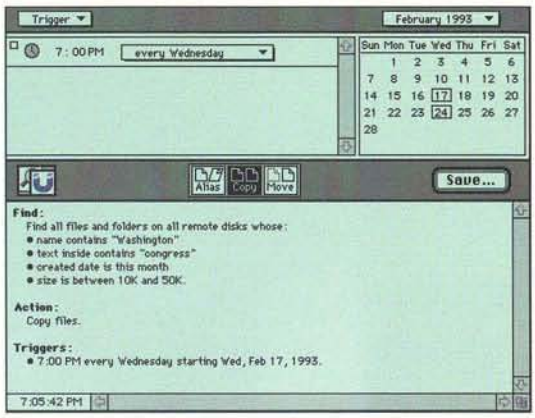
PROS: Searches by file attribute or content; requires no scripting; file-synchronization feature; can automatically log on to remote volumes using AppleTalk Remote Access. **CONS:** No Boolean search operations. **COMPANY:** No Hands Software (415/321-7340). **REQUIRES:** Mac Plus; 2MB of RAM; System 7. **LIST PRICE:** $129.95.

MW ★★★★

ALTHOUGH COMPUTERS MAKE routine work of jobs that would be impossible to perform manually, most computerized tasks still demand a good deal of human interaction. For years, computer visionaries like Alan Kay have predicted that someday smart software "agents" would go about their business independently. Magnet, billed as the first intelligent agent for the Macintosh, automates the laborious task of file management on a local disk or over a network. User-specified events trigger Magnet's agents (also called magnets); in response, and operating unattended, the magnets scavenge designated volumes looking for files and folders to copy, move, or alias.

Creating a magnet is a straightforward process. Unlike UserLand Frontier, which provides many more capabilities but forces you to learn a scripting language, Magnet lets you control the Mac Operating System via a system of pop-up menus. The first step uses an interface similar to System 7's Find command to tell Magnet what files and folders you want to look for. Magnet's filters let you scan by name, kind, location, date, label, or size. You also can search for files containing specified text strings, something you can't do with the Finder. Magnet doesn't support Boolean search operations, though, so you can't look for files that contain Clinton AND Bush, for example.

When you finish specifying your criteria, you can manually scan to test your search parameters. As Magnet works, files and folders that meet your specifications appear in a scrolling list. You can select items from the list one at a time, and open, locate, copy, move, create aliases for them, or put them in the Trash, but you can't shift-click to select multiple items.



Quick Trigger When you create an agent, Magnet displays an updated summary of your search criteria, triggers, and actions.

The next step is to indicate when the magnet should run. Magnets can be set to activate on a given date and time, or to repeat regularly (say, every Friday at 5 p.m.). You also can direct magnets to launch whenever the Mac is idle, or just before shutdown. The program's most powerful feature lets you instruct a magnet to trigger whenever a particular volume is mounted, either locally or on a network. For example, you can create a magnet that automatically backs up certain files whenever you insert a particular floppy disk or cartridge. If you use AppleTalk Remote Access, you can even have a magnet log on for you, mount and search a remote volume, and log off—all without supervision. (For security, you can lock and password-protect magnets.)

The last step before saving the magnet is to tell it what action to perform on the items it finds. (The magnet's location determines where found files and folders will be copied, moved, or aliased. The term *magnet* refers to the agent's ability to "attract" files and folders to its location.) If a found item already exists in the destination folder but has been changed since the last time the magnet ran, Magnet moves the older version into a special Conflicts folder instead of overwriting it, a wise safety precaution. Magnet's Sync function creates a pair of magnets that automatically makes the contents of any two folders identical by copying the most recent versions of all the files into both folders. Although this feature is intended primarily for users who want to reconcile a desktop and a portable Macintosh, it works equally well with any set of folders, even across a network.

Magnets can activate automatically only if the Magnet application is running and the Magnet extension is loaded. Magnet's Control window, accessible from the application, shows the triggers, status, and location of all your magnets, and lets you disable or run them manually; a separate Activity Log keeps track of what happens each time a magnet runs.

No Hands Software trumpets Magnet as a replacement for manual file-management utilities like On Technology's On Location. Scanning by file name, Magnet compares favorably with On Location, easily outperforming the Finder. Because Magnet doesn't use indexes, though, it can't match On Location at searching by content. (Note: If you use Salient Software's AutoDoubler, be sure to get Magnet 1.01. Because of conflicts in the way the two programs process background tasks, Magnet 1.0 cannot scan for text within AutoDoubler-compressed files.)

Magnet's agents are relatively primitive, and the range of triggers and actions should be expanded in future releases. But while Magnet is easy to learn, its concept is so novel that its potential uses may not be immediately obvious to many users—I tinkered for over a week before I discovered just how helpful Magnet could be, automatically cleaning up unwanted files and other housekeeping chores. Magnet's requirement that the application be running for agents to trigger is a potential pitfall, but fortunately, Magnet issues a warning before it quits.

Fault-tolerance also is critical for success. In my tests, magnets always triggered reliably, and problems encountered during execution never caused the application to crash. While single-volume users might prefer other utilities for manual file-management, anyone who routinely works with multiple disks will find Magnet invaluable.—FRANKLIN N. TESSLER

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Poetry CD ROM

Poetry in Motion

PROS: Effectively combines text and video; clear interface; flawless operation. **CONS:** None. **COMPANY:** The Voyager Company (310/451-1383). **REQUIRES:** Mac II; 4MB of RAM; color monitor, QuickTime-compatible CD ROM drive; hard drive; System 6.0.7. **LIST PRICE:** $29.95.

MW ★★★★

POETRY IN MOTION, BASED ON A FILM of the same name, juxtaposes performance videos of contemporary poets with the texts of their poems and with taped interviews. The result is a unique presentation that combines the excitement and emotion of the stage with the more reflective appeal of the page.

The 22 authors featured in Poetry in Motion are a culturally and stylistically diverse group, but they share the quality of being performance-oriented and accessible rather than academic. Whether it's beat poets like Allen Ginsberg; pop personalities like Jim Carroll; or writers not primarily known for their poetry, such as Ntozake Shange or William Burroughs, the writers in this selection are as likely to be found in a nightclub or coffee house as in the pages of the *Atlantic*.

Poetry in Motion is easy to install and use. You can read the poems with or without video accompaniment, either as they were performed or as published. I tried the disc on two computers. On a Quadra, the video looked fairly smooth and sound synchronization was convincing. On a IIcx, the visuals were jerky, but they still provided a feeling for the performer's style and personality.

It's not just the videos that make this disc come alive, it's the voices. Voices that bring out the hidden structure and rhythms of a poem, that sing or wail, that color one line ironic, another wistful. Anyone who enjoys poetry will value this disc. But the drama and interpretive power the performances bring to the verses make Poetry in Motion especially valuable for teachers and librarians trying to inspire new audiences (though some pieces do contain profanity).

It's hard to imagine anyone who has seen this work wondering "but what's the point?" That makes Poetry in Motion a rarity among multimedia projects available today. Better still, it's one of a handful of discs that go beyond providing online instruction or entertainment, offering instead moments of moving beauty, pathos, art.—JOE MATAZZONI

Oye! As the QuickTime performance video at top left plays, the poem at right pages forward. Touch on the window at bottom left to watch an interview.

600-dpi Laser Printer

HP LaserJet 4M

PROS: New print engine produces sharper characters; fast print speed; automatically switches between Mac and DOS printing. **CONS:** Price of new toner $150. **COMPANY:** Hewlett-Packard (800/752-0900). **LIST PRICE:** $2999.

MW ★★★★

PRINTING COMPLEX IMAGES USING an older HP LaserJet with a PostScript cartridge was just too slow. Thanks to technology, everything about the new HP LaserJet 4M from Hewlett-Packard improves upon the LaserJet III.

The 4M comes standard with 6MB of RAM (expandable to 34MB); is PostScript Level 2–capable; and has LocalTalk, parallel, and serial interfaces. It comes with the standard 35 Adobe Type 1 typefaces that Macintosh users have come to expect in a laser printer, as well as 35 Intellifont and 10 TrueType fonts for the DOS world.

The printer can interpret HP's PCL (Printer Control Language) and PostScript, and it can accept input from a DOS machine and a Mac at the same time without the user having to set any switches or unplug any wires! This autoswitching is a must in a mixed-platform office. One user can print a Mac document via LocalTalk while another user can print a document from a DOS workstation without either user resetting the printer.

The 4M has an Intel i8960 RISC processor—a big improvement over the 68000 processors used in many of today's printers. Printing times are less for complex graphics from Aldus FreeHand and Adobe Illustrator, for example, and for documents containing many fonts in a variety of sizes. At 300 dpi, print speed is equal to that of Apple's LaserWriter IIg. You will notice a vast difference in performance speed when you compare the 4M at 600 dpi with others at the same resolution, such as the QMS-PS 1700, Xante's Accel-a-Writer, or the Lexmark LaserPrinter 10A (see "Workgroup Printers," *Macworld*, January 1993).

The 4M is also one of the first printers to use the new Canon LBP-EX engine, capable of printing at a true 600 dpi. That means you get four times as many dots per inch as you would at 300 dpi without interpolation. The engine is rated at the standard 8 pages per minute for 300-dpi printing and also for printing simple, single-font documents at 600 dpi. Macworld Lab test results show little discrepancy between the 300-dpi and 600-dpi print time for a 20-page single-font Word document—a mere two seconds!

The people at Canon have done away with the corona wires and replaced them with a roller that actually makes contact with the paper. With all other existing engines, the corona wire is charged and attracts toner from the drum to the paper. This process can result in characters with fuzzy edges, since the wire sometimes produces a stray charge. By making physical contact with the paper, the 4M can print sharper, more-controlled characters. With the new engine comes microfine toner—toner whose particles are roughly 20 to 30 percent smaller than previous toner particles. When you combine the new printing method with the microfine toner, 600-dpi resolution, and HP's Resolution Enhancement Technology, the result is clean, sharp output.

The LaserJet 4M is a definite winner when compared with its predecessors. The switch to a RISC processor has accelerated printing complex images and even documents with a lot of fonts. The new print engine and toner guarantee smooth curves and crisp characters. And its all-ports-active feature makes the 4M one of the most flexible printers on the market today.—DANNY LEE

HP LASERJET 4M PERFORMANCE

	600 dpi	300 dpi
Multifont document Word 5.0	216.07	174.59
Single-font document Word 5.0	174.11	172.01
Complex document MacDraw Pro 1.5	168.64	169.89
Complex document FreeHand 3.1	495.81	400.78
4-page document PageMaker 4.2a	148.16	133.59

MW LAB *All times are in seconds. For detailed information on the documents used for the tests, see the chart "Rating Printer Performance" on page 136 of* Macworld's *January 1993 issue.*

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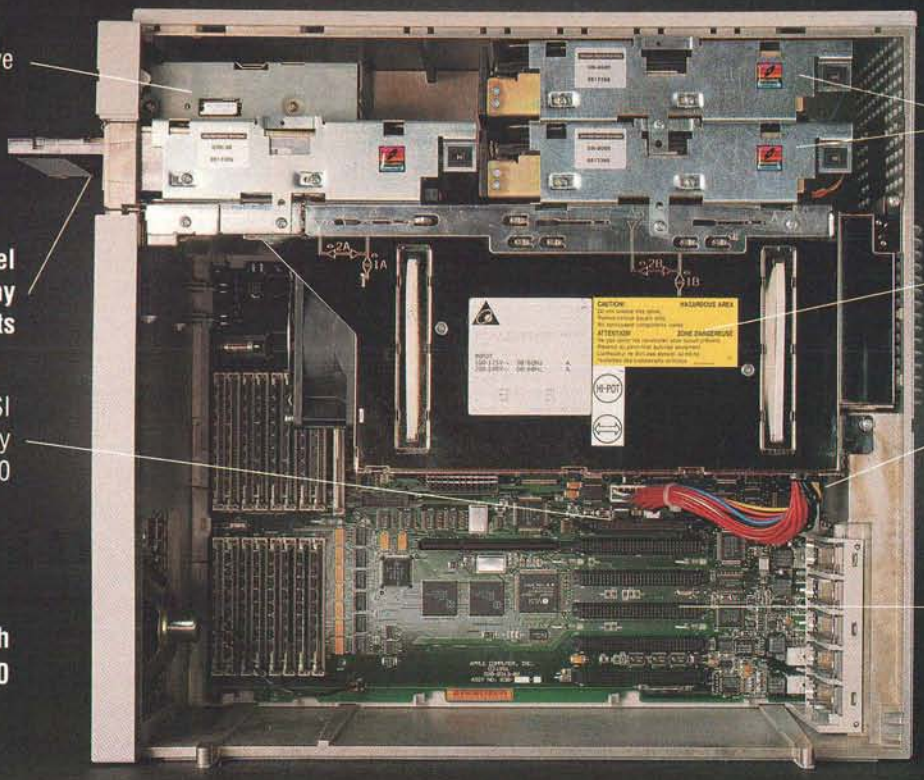

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Circle 113 on reader service card

Gray-Scale Paint

Sketcher 1.0

PROS: Excellent reproduction of traditional drawing tools. **CONS:** Can't export record sessions; icons should be smaller. **COMPANY:** Fractal Design Corporation (408/688-8800). **REQUIRES:** Mac II; 2.5MB of RAM; hard drive; System 6.0.5; 32-bit QuickDraw. **LIST PRICE:** $149.

MW ★★★★

PACKAGING IS NOT USUALLY GRIST for reviewers, but Sketcher's is so novel, you can't miss it. And you shouldn't. The program comes in a facsimile of a cigar box, complete with a drawing-pad-like manual. Sketcher, a gray-scale paint and image processing program, is wonderful.

Similar in style to Painter, its 24-bit color version, Sketcher offers a multiplicity of effects reproducing the styles and techniques of traditional drawing tools. However, Sketcher is more straightforward, faster, and simpler to operate than Painter.

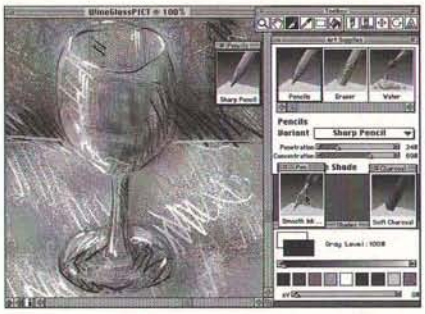
Sketcher uses floating palettes. The smallest one holds generic tools, such as a magnifying glass and marquee, as well as tools for applying friskets (masks) and importing TrueType and PostScript fonts for textured text. Other palettes let you customize brush sizes, define fills, edit friskets, and access different paper surfaces.

Drawing implements, such as pencils, charcoals, pens, crayons, and water, are organized by icon in the Art Supplies palette. You select individual tools (Variants) from the Art Supply pop-up menu. All variants can be fine-tuned for penetration (how tools interact with paper surfaces) and concentration (how tools interact with previous strokes), making them infinitely modifiable. In addition, many variants respond to pressure-sensitive input, such as is offered by Wacom digitizing tablets.

You can tear variants off the floating palette for recurrent use (Painter could use this feature), and you can save customized variants, but you can't name them or add them to the pop-up menu; nor can you have two customized versions of a variant active simultaneously. Smaller art-supply icons would also be an improvement. This palette dominates small screens, and torn-off tools can quickly clutter the work area. Still, Sketcher's interface is well designed, logical, and adaptable.

Sketcher's brightness, contrast, sharpening, softening, and posterization effects can be applied to an entire image, selections, or friskets. Sketcher also lets you apply artistic effects to photos as their clones.

If you enjoy dazzling your friends, you'll love Sketcher's Record Session feature. Turn it on, and Sketcher keeps track of every brush stroke and command. Play it back to see an animation of your creative process. Currently, Sketcher cannot export these animations as PICS files or QuickTime movies. Maybe next version.



Artistic Impression Sketcher offers a wonderful combination of natural drawing effects and computer editability.

The manual is concise, thorough, and peppered with examples, but there are no sample files. However, Sketcher is easy to learn. Doodling and trying out all the interactions is the best way. For all its technological prowess, Sketcher is at heart an artist's tool that encourages creativity. If you draw for a living, or simply like to dabble, you'll find Sketcher irresistible. —CARLOS DOMINGO MARTINEZ

Telephony Software

PhonePro 1.0.3

PROS: Flexible protocols; icon-based programming; includes database and connection to Microsoft Mail and CE QuickMail. **CONS:** More suited to developers than end users. **COMPANY:** Cypress Research Corporation (408/752-2700). **REQUIRES:** Mac Plus; 4MB of RAM; hard drive; System 7. **LIST PRICE:** $950.

MW ★★★★

WHAT, YOU MAY ASK, IS TELEPHONY? Telephony rears its modern but not entirely attractive head when you dial a number expecting to talk to someone and get "if you wish to speak to customer service, press 1" and you press 1 and then hear "if you're calling about WonderWidget version 3, press 4," and so forth. PhonePro is an application that makes it relatively easy to set up this sort of system on a Mac. Fortunately, it's not simply a tool for driving people crazy. In fact, it's advanced enough to make better and friendlier versions of this apparently necessary evil.

PhonePro includes a 9600-bps, single-line modem with a headset connection and a headset/microphone. You use this setup to record outgoing messages as digitized sound on the Mac; incoming voice messages are likewise stored and compressed on the Mac's hard drive (a 20-second message takes about 85K of drive space). For managing these messages and storing them in order, PhonePro software presents you with palettes of icons that represent different possible program operations: pick up phone, play message, receive tone signal, pick another message in response to signal, and so forth. You drag these icons to the work space and connect them to set up a protocol; a simple answering machine protocol takes seven icons simply connected in a straight line (Go, Pick Up, Play Msg 1, New Record, Take Incoming Msg, Play "thank you," Hang Up).

The point of PhonePro, though, is really to construct fancier stuff. If you don't have much programming experience (PhonePro strongly resembles the icon-programming schemes in Odesta's Helix, Serius's Serius, and National Instruments' LabView, for example), there are sample scripts that cover PhonePro's two main uses: branched multiple-question scripts and voice-mail operations. PhonePro provides some nice touches for branching scripts. You can generate different outgoing messages from a Word Table, you can make a system that finds a human for desperate callers to talk to instead of dead-ending at a voice mailbox, and you can store caller information in a database (each database record has eight fields) that date/time stamps each message. PhonePro supports the sort of detail that lets callers punch in a contact's name if they don't know the extension; it's as complete as the best commercial systems. You can use PhonePro not only as your main voice-mail system (it can send messages over a local network as well), but also to forward voice-mail messages to CE Software's QuickMail and Microsoft Mail (there are icons for automated log-on and log-off from these services). And of course you can mobilize all this firepower for outgoing calls too, using it to direct automated telemarketing at people who are simply trying to eat dinner in peace.

PhonePro makes programmed telephony as easy as it's going to get; I set up a multiple-level voice-mail system for a small retailer in a few hours, but I was calling on years of experience in icon-based programming in LabView. If you have no programming background, you might be stuck making only small modifications to the scripts supplied by Cypress—extending PhonePro's capabilities using Apple events, for example, is not an ideal sport for beginners. But PhonePro is a good product, lives up to its claims, and promises the beginning of voice-mail systems with more humane and engaging "personalities" than we've seen in the past.—CHARLES SEITER

1.

5.

DON'T CALL ORKIN.*

When the Mac first came around, everybody loved its *little rodent.* No cursor up. No cursor down. Man, what a handy device. Then people got into graphic arts. Whoops. *Mousetrap!* INTRODUCING ARTZ.™ The flashy, jammin', way cool ADB graphics tablet from Wacom. ArtZ simply *plugs into your ADB port* and lets you create graphics using a cordless, batteryless, pressure-sensitive stylus, about the size and weight of a fine pen. Now, creating art on a computer is as *natural* as creating art on a note pad, a canvas, or even a subway. To see just how flashy and way cool the ArtZ is, TAKE THIS SIMPLE TEST: *(1)* Cut out the mouse at the top of the page. Blow it up if you like. Now *(2)* *trace it* with the mouse on your computer. Then *(3)* print it, and *(4)* scurry on down with both to your local Wacom dealer. Don't know where one is? Just call *1-800-922-6613.* When you get there, *(5)* trace the mouse on an ArtZ. *Feels good,* doesn't it? Now *(6)* print it and *(7)* compare the two. OK? Now *(8)* pull out your pocketbook. You've been doing *mickey mouse art* long enough.

2.

6.

3.

7.

4.

8.

*For the mice that run on a Mac, you can't call for pest control. But for the mice that run on top of a Mac, and under a Mac, and in the cupboards and stuff, call these guys: Orkin Exterminating.

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Fax and Data Modem

Sportster 14,400 Mac & Fax

PROS: On-screen help; high-speed throughput; front-mounted volume control; modem cable included. **CONS:** Complicated documentation; data communications occasionally garbled despite error controls. **COMPANY:** U.S. Robotics (708/982-5001). **LIST PRICE:** $599.

MW ★★★★

THE SPORTSTER IS U.S. ROBOTICS' first real attempt to target the Macintosh market. True, other U.S. Robotics modems can operate with a Mac, but they're usually bundled with PC software, a non-Mac cable, and perplexing PC-only documentation. The new Sportster comes 100 percent Mac-ready, complete with a high-speed Mac modem cable and Macintosh fax software right in the box.

In data mode, the Sportster is a speed demon; it connects at rates of up to 14,400 bps (bits per second). With the modem's V.42bis/MNP Class 5 data-compression enabled, you can achieve throughput of up to 57,600 bps—depending heavily on the quality of your phone line. The Sportster slows to whatever speed is necessary to ensure accurate transmission.

In its default configuration, the Sportster always negotiates for the fastest connection and highest levels of MNP protocol. If the connecting modem is operating at a lower speed or does not support the more-advanced features, the Sportster drops its speed and establishes the best connection it can. To take full advantage of the modem's high-speed error-control features, you must use it with telecom software that supports hardware flow control rather than XOFF/XON signaling.

The Sportster provided highly reliable communications when I connected to BBSs and online services at 2400 bps and 9600 bps. I also had good success with Xmodem-protocol transfers, though a staticky phone line still managed to produce a stream of garbled characters on one occasion.

The Sportster's documentation, though still a bit too technical and slanted toward PC users, is adequate. There's also a quick-reference card you can remove from the manual for easy use. Better still, the Sportster can produce its own help screens. To view the help screens, you simply issue the proper AT modem command from within your telecom program. The screens provide a summary of the codes and commands needed to adjust the modem's settings.

As for design, the Sportster has several features often missing on other modems, such as an easily accessible power button on the side of the unit and a front-mounted volume-control dial that lets you adjust the output level of the modem's internal speaker without issuing a command with your telecom software. There are also nine status lights along the top to indicate when the modem is connecting, sending, or receiving data; set to autoanswer; retransmitting data under error control; or in fax mode.

Like most fax modems, the Sportster is compatible with all 9600-bps Group III fax machines, and in my tests, it sent and received faxes cleanly and reliably. The modem comes with the latest version of Fax/stf, a widely distributed fax application.

With Fax/stf, you can send a fax from within any application with a print command by selecting the FaxPrint extension from the Chooser. The program provides group-faxing capabilities, and you can schedule faxes for future transmission. In the Fax Manager you can store a directory of frequently called fax numbers.

If there's anything disappointing about the Sportster, it's that you probably won't be able to use a lot of its features—unless you have a friend with another full-featured 14,400-bps modem. There just aren't many 14,400-bps modems at this time—but, of course, that's what people said about 9600 bps not too long ago.—JOSEPH SCHORR

Educational Game

SimLife 1.0

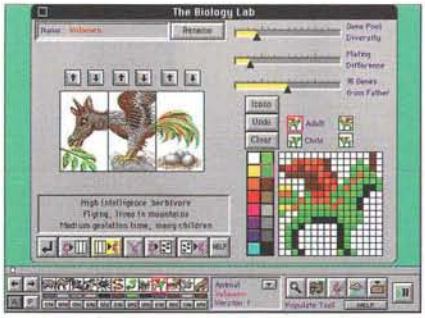
PROS: Educational; variety of scenarios. **CONS:** Difficult to learn. **COMPANY:** Maxis Software (510/254-9700). **REQUIRES:** Mac SE; 2MB of RAM; hard drive; System 6.0.2. **LIST PRICE:** $69.95.

MW ★★★

MY HUMPBACK WHALES ARE FLYING! This is not a bug, it turns out, but a feature of SimLife. I also witnessed aquatic llamas and carnivorous squirrels, thanks to rampant mutations. With SimLife, Maxis (which gave us SimCity, SimEarth, and SimAnt) has tackled the formidable task of simulating life itself.

SimLife is a megalomaniac's dream come true. The simulation gives you tools to create mountains, oceans, and deserts; populate your world with fish, fowl, and plants; change climate or terrain at will; invent new species; or unleash natural disasters such as floods, plagues, and comets. What other program gives you a Smite command? (Well, Microsoft Word might—I'm not yet familiar with all its features.)

Anybody can summon a comet; in SimLife, the hard part is creating a well-balanced, functioning ecosystem. Certain plants need cold weather to germinate; carnivores must have other animals to eat; animals must survive long enough to mate and pass on their genes. Fortunately, SimLife's life-forms can evolve, by means of mutations, into plants or animals more suited to a particular environment. As a session goes on, you can see how various species adapt to ever-changing conditions. The manual suggests several scenarios to try out, such as an isolated island community reminiscent of the Galápagos, or the introduction of a destructive alien species into an established ecosystem. You don't have to be a passive observer—you can alter various factors as a simulation progresses. (My major gripe is that you can reintroduce a species once it's become extinct.)



It's Alive! Despite their often fanciful appearance, the animals you create in SimLife exhibit many of the characteristics of their real-world cousins, including the ability to produce offspring.

You view your world through a series of windows, graphs, and status reports. The Map window shows you a bird's-eye view of an ecosystem in action; zoom in to the Edit window to watch individual plants and animals, represented by animated icons. (You're subjected to constant audio feedback, with a spicy "ooh-la-la!" indicating mating, and a sad little "ooh!" signaling a creature's demise.) In the Biology Lab window you specify traits such as intelligence, habitat, diet, and number of offspring. You can check on each species in several Census windows, which include population statistics, a history of mutations and extinctions, and a report on who's eating who.

SimLife's complexity is both a blessing and a curse. Let's face it, life itself is complex. However, one look at, say, the Animal Genome window, with its 23 sliders, 20 buttons, and 4 pop-up menus, is enough to make a budding biologist flee in terror. It'll take you several days to learn SimLife. But it isn't just some arcade game; each simulation produces different results, based on a sophisticated set of rules. Building a successful simulated world isn't easy, but the reward is an increased understanding of the complex interrelationships that sustain life in the real world.—ERFERT FENTON

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Idea-Development Software

Inspiration 4.0

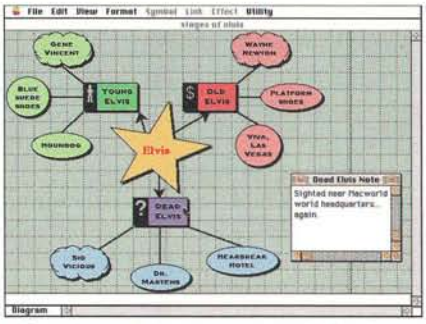
PROS: Elegant interface and easy-to-customize formats; diagram and outline modes are well integrated. **CONS:** Brainstorming capabilities are only as good as the user. **COMPANY:** Inspiration Software (503/245-9011). **REQUIRES:** Mac Plus; second disk drive; System 6.0.4. **LIST PRICE:** $295.

MW ★★★★

I ADMIT IT. FOR YEARS, IF AN OUTLINE was required, I constructed one after the fact. I persisted in the cut-paste-and-rewrite school of composing. Finally I pirated from a train mate a great technique for visualizing ideas. Rather than starting with a rigid, linear outline, the gentleman across the aisle summarized each thought in a word or two, circled it, and linked it to another topic; sometimes he set related ideas in orbit around a circled thought. A topography of the overall concept began to emerge.

The beauty of Inspiration is that you watch your ideas evolve in both a text-based Outline mode and in a dynamic Diagram mode. In the latter, you begin by typing your central concept into the Main Idea symbol. You add topics by typing a word or two into one of 63 predefined symbols; you can also import or draw custom symbols. To annotate a topic idea, you call up a symbol's Notes Text window; each window holds up to 15K. (I do wish the cursor appeared at the end rather than at the beginning of previous text when you reopen a Notes Text window.) Customizing a diagram with color-coded symbols and a medley of links is just as easy as choosing from a palette.

Whether you are developing a free-form diagram or a well-defined flowchart, space constraints may convince you that it's time to Adopt a Child—Inspiration argot for opening a file linked to a topic; the child file makes the selected topic the Main Idea in a whole new flowchart. You can also Print or Disown a Child, and the excellent manual reassures, "Children do not use memory until they are opened."



Take a Note To annotate any symbol, call up its Notes Text file and record up to 15K of data. (That's nearly five times the length of this review.)

When you switch to the outline, ideas are arranged in an indented format that mirrors the levels of topics and subtopics in the diagram. All the familiar outliner features are there: collapse and expand; promote and demote; sort; and check spelling. There's even a special treat, the ability to calculate numbers embedded in subtopics and show the sum in the topic, useful when figuring budgets, for example. Topics, subtopics, and Notes Text added to the outline appear automatically in the diagram.

Printing is straightforward; the Fractional Fonts feature improves the quality of files printed in reduced format. You can import files in text-only and Inspiration 3.0 formats, you can import files from Symantec's More, and you can export formatted outlines to most word processors.

Overall, Inspiration is fairly fast, easy to learn and to customize, and the two modes complement each other well. Although it's also touted as a presentation tool, Inspiration works best as a vehicle for organizing and developing ideas. Unfortunately, it can't be expected to solve all our conceptual problems. After all, the old saw still holds: You can write only as well as you can think.—SUZANNE STEFANAC

Geography Software

MacGlobe 1.3

PROS: Great assortment of maps and statistics; just about ideal for high-school-level projects; can export graphics. **CONS:** Performance problems on low-end hardware and small monitors. **COMPANY:** Brøderbund Software (415/382-4400). **REQUIRES:** Mac Plus; hard drive; System 6.0.4. **LIST PRICE:** $59.95.

MW ★★★

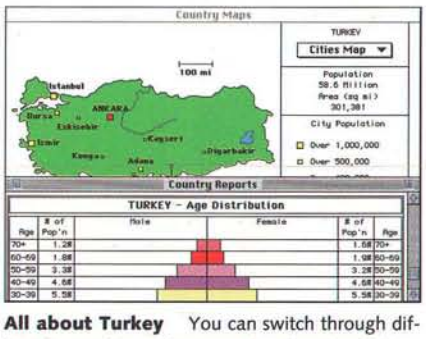
TEN YEARS AGO, COMPUTER MANUfacturers and educators assumed that computers would revolutionize and accelerate education in the United States. It's safe to say that the bright hopes in this area have not been realized, and the problem has been a lack of high-quality, imaginative software. One significant bright spot in education is the best-selling lineup of products from Brøderbund, the people who made Carmen Sandiego a household name. Recently the company acquired MacGlobe, outfitted it with some modifications and a new manual, and dropped the price.

MacGlobe's atlas of the world was correct in early 1992: there's just one Germany, the parts of the former Soviet Union are correctly represented, and what was formerly Burma with its capital at Rangoon is now called Myanmar administered from Yangon; but Bosnia is still part of the Yugoslav Federation. Because it's on disk, it's easily updated (updates cost $25), and updates include not just map changes but also changes in tabulated data.

The quantity of information in MacGlobe is impressive. Besides maps and little bits of fun (the program displays flags and plays national anthems), MacGlobe offers complete demographic and economic data (birth and death statistics and projections, age distributions, health and educational data, exports, imports, tourism, GNP). The data is presented not just in standard bar charts but also as thematic maps—in thematic maps color codes or patterns indicate numerical values for parameters such as literacy or infant mortality. MacGlobe also computes distances between map points, converts currencies, and computes time differences around the globe. The documentation of data sources is exceptionally thorough, so students using MacGlobe for school projects can find the original documents.

This program faces some problems common to all Mac-based atlases. First, the 72-dpi standard display means that the Apple 12-inch monitor, ubiquitous atop LCs in classrooms, gives pretty grainy maps. Another problem is that graphs are saved as PICT files for easy Clipboard export to word processors or page-layout programs. Most of the data presented in charts would be more useful in compact form as tabbed text for import into other graphics, statistics, or spreadsheet programs. Finally, this program tests the usefulness of scrolling lists as a selection device: scrolling through 208 countries with only 5 entries visible is fairly annoying.

But the high-quality data selections and flexible mapping make this program a necessity for schools and a fascinating intellectual adventure for home use. It could stand some improvement in data export, but it's the best geography product currently available for the Mac.—CHARLES SEITER



All about Turkey You can switch through different map views of any country or region in MacGlobe and call up an impressive array of demographic and economic statistics.

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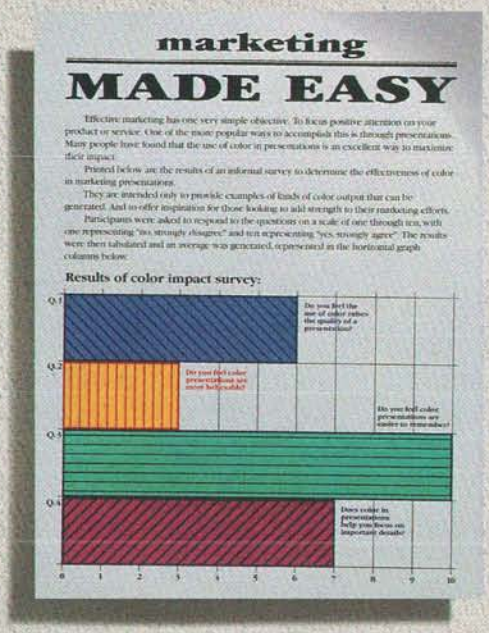

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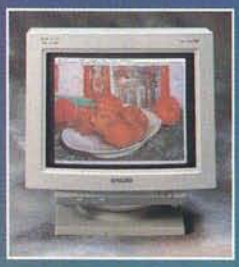

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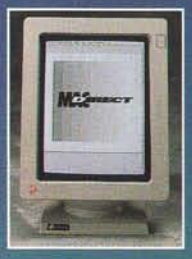

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Music Education on CD ROM

So I've Heard, Volume 1: Bach and Before

PROS: Good summary of, and collector's guide to, early Western music; numerous musical excerpts; affordable. **CONS:** Omits some essential works; music stops when new card appears. **COMPANY:** The Voyager Company (310/451-1383). **REQUIRES:** Mac Plus; 2MB of RAM; hard drive; CD ROM drive; speakers or headphones; System 6.0.5. **LIST PRICE:** $24.95.

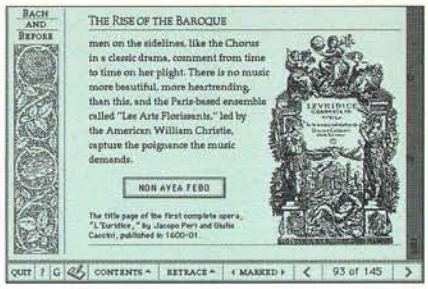
MW ★★★★

ONE THING THE CURRENT CROP OF music-appreciation CD ROMs lacks is a bird's-eye view of the grand sweep of Western music. Warner Audio includes a history of the requiem as a musical form in Johannes Brahms, A German Requiem, and a brief rundown of opera's first few hundred years in Mozart, The Magic Flute. To fill the gap, The Voyager Company plans a five-disc survey called So I've Heard.

The first volume in the series, Bach and Before, describes nearly two millennia of Western music, up to the mid-eighteenth century. The text, engagingly written by classical-music critic and lecturer Alan Rich, is divided into nine short HyperCard-based chapters. Most cards are enlivened by period illustrations; buttons scattered throughout let you play the musical examples highlighted in the text. (Unfortunately, moving to a new card immediately silences any music that may be playing.)

Rich's carefully selected musical examples double as his recommendations for a basic collection. They provide a unique and affordable opportunity to sample 50 or so specific performances, compositions, and musical styles before you decide to buy. I have just two small quibbles: I wish Rich had at least noted second- and third-choice recordings for people who don't live near a classical-music superstore. Also, Rich tends to bypass compositions of well-known composers if he feels they're overexposed—Vivaldi's *Four Seasons*, for instance. Anyone starting a music collection based on So I've Heard would thus miss one of the greatest (and yes, most overexposed) of baroque compositions.

The musical examples are also listed in a HyperCard catalog, each card containing the composer, title, performance, label, and a brief commentary for a single work. You can search the catalog by composer, performer, label, or type of music or era, and you can add your own cards. In both the catalog and the main essay, you can enter notes (linked to specific cards) in a pop-up notepad, and you can mark cards for retrieval. You can also print part or all of the catalog and/or main essay.



Early Music Sampler Buttons at the bottom of the window help you navigate the program, open the notepad, turn on the balloon help system, and highlight words in the glossary.

Because the volume of material here is so broad, discussion is necessarily not very deep. You won't find serious discourse on music theory—no measure-by-measure analysis, no disquisition on the sonata form, no lengthy explanation of rhythm, meter, or musical notation.

Some people love the music featured in this CD ROM, but many find it spare and not immediately accessible. For anyone interested in classical music and daring enough to go beyond the concert-hall hit parade, Bach and Before is a musical history tour without peer.—ROBERT C. ECKHARDT

ADB Controller for Multimedia Applications

Media Control Station

PROS: Optical wheel moves smoothly and accurately; buttons are easy to customize. **CONS:** Documentation is unclear in places. **COMPANY:** JLCooper Electronics (310/306-4131). **REQUIRES:** Mac Plus; System 6.0. **LIST PRICE:** $269.95.

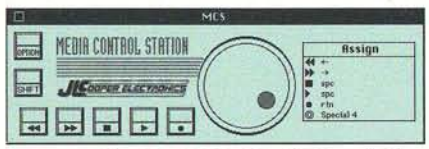
MW ★★★★

FIRST, TO QUELL ALL INNUENDOS OF bias, I am not related (even distantly) to anyone presently or previously employed by JLCooper. My people are honest barrel-makers from Virginia. Now let's talk about the Media Control Station. If you work with Adobe Premiere, Macromedia's MacroMind Director, Digidesign's Sound Designer II, or any application that manipulates temporal data, I recommend that you check out the Media Control Station (MCS).

The MCS is a small black box, the size of a skinny brick, that connects to the Mac through the ADB port (it has a second ADB port for chaining a keyboard and pointing device). On the top of the box are seven buttons (rewind, fast forward, stop, play, record, shift, and option), and a silver dollar–size wheel that has an indentation for turning it with your finger. The MCS comes with settings for four applications and includes an application for defining key sets for other Mac programs.

I first tried using the MCS with Adobe Premiere 2.0 (a tryout version of Premiere 1.0 comes with the MCS). Rather than using the mouse or keyboard to control the playback functions, I put the MCS to the test. Rotating the wheel clockwise or counterclockwise advances or rewinds a QuickTime movie by one frame per stop. This is similar to the way the jog/shuttle wheel on a professional video deck works. In jog mode, when you rotate the wheel, it moves the tape forward or backward in one-frame increments. I found using a wheel invaluable, especially when setting in-points and out-points in Premiere. Trying to move through movies precisely by pushing buttons with the mouse is a real pain.

The MCS wheel also allows shuttling, which involves moving through tape (or data) at a variety of speeds (such as half-speed, five times normal speed, or ten times normal speed) by turning the wheel left (for reverse) or right (for forward) of center and holding it there. The farther you turn the wheel, the greater the speed. JLCooper offers shuttling for Sound Designer II; it is not available for Premiere.



Programming the MCS The MCS application enables you to edit preset configurations for the device or create your own group of commands.

Pressing combinations of buttons on the MCS invokes functions in Premiere that let you set an in or out point, move forward or backward five frames, and play or stop a movie. There are 20 different key combinations that have preset functions, or you can give them new functions by using the MCS application.

Four factory-preset combinations invoke the function keys found on extended keyboards. This is especially useful if you have defined these keys using a macro program such as CE Software's QuicKeys.

Also included on the MCS disk are preset functions for MacroMind Director, Claris HyperCard, and Opcode's Vision. The device defaults to the settings for Premiere, but you can change the default using the MCS application. I found it easy to program my own commands for other applications, and once I deciphered the poorly written manual, modifying existing sets was a snap. The MCS is a versatile tool, and it's invaluable for zipping through MIDI files, Director scores, and QuickTime footage like a pro.—EVAN COOPER

Address Book and Reminder DA

Intouch 2.0.4

PROS: Flexible output options; database is accessible while working in other applications. **CONS:** Free-form data entry limits sort options; calendar's list view shows reminders, not events. **COMPANY:** Advanced Software (408/733-0745). **REQUIRES:** Mac Plus; System 6.0.3. **LIST PRICE:** $99.95.

MW ★★★

INTOUCH 2.0.4 ADDS A REMINDER SYSTEM to a fast, easy-to-use database for storing addresses, phone numbers, and other contact-related information, while retaining the free-form approach to data entry. Unlike address books that provide separate fields for names, cities, phone numbers, and other facts, Intouch lets you enter contact information any way you like.

Without fields, however, Intouch can't automatically capitalize names or format telephone numbers as you type. The lack of fields can also lead to unpredictable results when you try to sort the database. The manual suggests that you use a standard address format, so the company name would always go on line two of the address field, for example. For sorting purposes, Intouch distinguishes between the first, second, and last words in address lines, and it recognizes U.S. zip codes.

Intouch lets you assign records to groups—for example, all your friends in one group and relatives in another. (If you are friendly with a relative, you can assign that contact to more than one group.) You can also find records that contain or don't contain specified strings of text.

The Dial button lets you place a telephone call over your modem or through the Mac's speaker. To reach outside lines or long-distance services, you enter special sequences before and after the main number. Because there are no phone-number fields, Intouch's scheme to distinguish telephone numbers from other numeric data works well for standard North American number formats. Intouch also allows you to identify foreign telephone numbers.

Intouch offers four print options: envelopes, labels, address books, and fax cover sheets. All the formats are easy to customize: on envelopes, for example, you can specify the location and appearance of the address and return address, and you can add bar codes. However, if you move the return address by mistake, you must save the changed version under a new name.

The reminder function lets you schedule events for a specific date, for a point in time, or for a block of time. You can set alarms to notify you ahead of time; if the reminders control panel device is installed and turned on, alarms will pop up on your monitor even if Intouch isn't running.

Unfortunately, Intouch falls short as a calendar planner: when you display reminders for any day, week, or month, the list shows only the advance alarms you've set, not the events themselves. There is a daily view that includes both alarms and events, but that's not sufficient to plan activities a week or a month at a time.

A control panel device called Snap lets you access Intouch while you're working in other applications. If you're using a word processor to write a letter, for example, you can select the recipient's name and search the Intouch database. Snap scans the address book and lists the matching entries; selecting one pastes the associated address into the document. You can also use Snap to add entries to the Intouch database, dial phone numbers, and print envelopes or labels, all without leaving your application.

Despite the free-form data entry, Intouch is a good choice if you need to look up names and addresses and print envelopes. The ability to search the database and print without leaving your word processor is a definite plus. But until Intouch provides more ways to view events, I can't recommend it as a calendar planner.

—FRANKLIN N. TESSLER

Stress-Relief Software

Insanity 1.0

PROS: Realistic sound effects; detailed animation; variety of modules. **CONS:** Novelty wears off; installing modules is complicated; promotes violence in society . . . NOT! **COMPANY:** UV Wave (318/868-9944). **REQUIRES:** Mac Plus; 2MB of hard drive space; System 6.0.5; 32-bit QuickDraw. **LIST PRICE:** $28.95.

MW ★★★★

MUCH AS I LOVE AND APPRECIATE my Mac, there are times when the computer so frustrates me that I'd just like to slap it upside the head. Then I realize that smacking an expensive, fragile box of bits and bytes would be less than prudent. That's when I reach for Insanity.

Originally introduced as Madness-Rage from Me & John Software, Insanity has been improved and completely rewritten by the two-man publishing house of UV Wave. This cool little control panel (cdev for System 6) lets you harmlessly "shoot" the Mac whenever your blood pressure climbs or your trigger finger itches. Just click the mouse while pressing the user-definable ⌘-*key* combination, and Insanity's floating menu appears on the menu bar, displaying a list of the "weapons" at your disposal: sea pigeon, 12-gauge assault rifle, 20-gauge shotgun, .44 caliber magnum, BB gun, Bill the human cannonball, 9mm Glock pistol, Moof .45, and an Uzi machine gun.

Once you choose a module from the floating menu (or allow Insanity to pick one at random), the cursor turns into an appropriate gunsight. For instance, the cursor becomes a normal sight for all the pistols and rifles, a bird for the sea pigeon, a bull's-eye for Bill the human cannonball, and bovine buttocks for Moof the Dogcow.

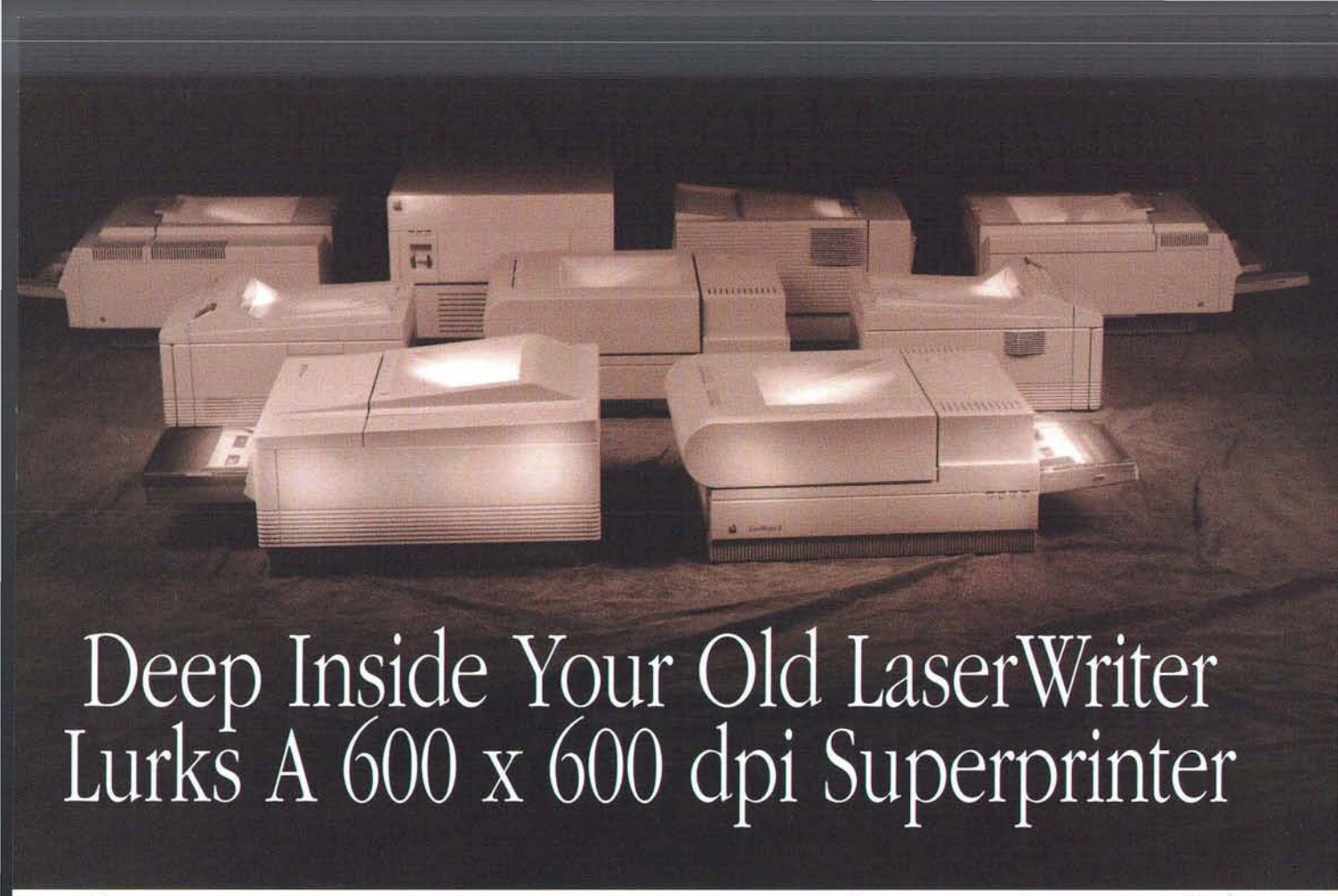
To shoot, move the cursor anywhere on screen and click the mouse button or press the user-definable ⌘-*key* combination for the gun trigger. What happens when you pull the trigger depends on the module. As you might expect, each of the real weapons goes off with a distinctive bang (or in the case of the shotguns, resounding booms) and tears convincing bullet holes in the Mac's display. The Glock blows perfectly round holes with deadly accuracy, the shotguns perforate the screen with buckshot.

If you prefer something a little more disgusting, check out Insanity's three non-weapons. The sea pigeon lets loose a sticky glob of white goop (sure to have the kids laughing hysterically), Moof deposits a cow pie that lands with a resounding thud, and Bill the human cannonball flies gracefully through the air until he splatters onto the desktop with the same disgusting result as a bug hitting a windshield at 70 mph. The animation is first-rate and looks great in monochrome as well as color (requires 32-bit Color QuickDraw).

When you're finished shooting up the place, or you've expended all of your ammo, press the return key to hang up your holster and resume work. Everything on screen returns to normal, with bullet holes and bird droppings cleaned up in a flash.

The default settings for each module accurately reproduce the characteristics of the actual weapon. For example, the standard Glock clip holds 15 rounds, each of which can be squeezed off individually in rapid succession. But sometimes it's more fun to tweak the performance. Using the Insanity control panel, you can set the total number of shots, shots per burst, and firing speed for each module.

Insanity is a fun program that lets you harmlessly blow off steam. After a while, however, the novelty of blasting the Mac to smithereens wears off. Still, Insanity is worth keeping around to entertain your friends and strike fear into the hearts of your enemies. My only real complaint is that enabling individual modules in the control panel is awkward and unnecessary. For simplicity's sake, all modules should be available simply by their presence in the System Folder.—OWEN W. LINZMAYER



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Home-Landscape-Design Software

Expert Landscape Design

PROS: Extensive toolbox; good scaling features; easy to learn. **CONS:** Awkward color and pattern tools; limited object libraries; few library objects are labeled; nonstandard Mac interface. **COMPANY:** Expert Software (305/567-9990). **REQUIRES:** Mac Plus; System 6.0.5; 32-bit QuickDraw. **LIST PRICE:** $49.95.

MW ★★

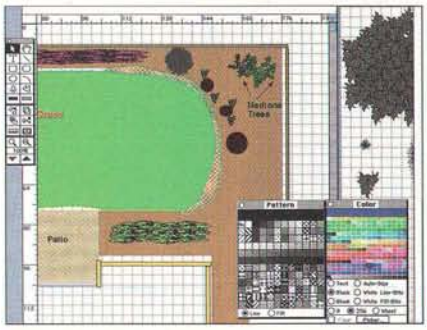
EXPERT LANDSCAPE DESIGN OFFERS amateur landscape artists an inexpensive, easy-to-use object-oriented graphics environment for designing gardens literally from the ground up—from ground cover, trees, and shrubs, to garden furniture. However, by neglecting to identify plant types or to facilitate precise drawing, the program fails to give budding home gardeners a good tool for landscape design.

Expert Landscape Design creates a view of your garden from above, like a floor plan. You then design the garden using a combination of library objects and objects you draw yourself in the familiar Macintosh drawing environment of snap-to grids, layers, scalable rulers, and so on. The toolbox also contains several specialized features, such as fence- and wall-drawing tools, a vertex grabber (for editing polygons), replace and copy tools (used with library objects), and a measuring tool.

Expert Landscape Design uses several distracting cursors, including a crosshair and a pointing finger to indicate the direction objects are being moved in. The program also presents annoying phantom outlines of marquees that follow the pointer cursor when you select and move multiple objects. And you must click on an empty area of the screen, rather than on another object, to deselect an object. The program also redraws very slowly. All these behaviors hinder the ability to draw. You can, however, import PICT files from other draw programs and use them in your on-screen garden plot. The program supports color, but in a somewhat roundabout way.

After you scale and draw the area of your garden using the ruler and the wall and fence tools, you select and arrange the plants and furnishings. The program has several libraries of plants and yard furniture with which to populate your landscape (don't expect to identify the plants stored in the library, though—none are labeled), and you can add your own hand-drawn plants, pools, and furniture to libraries. Placing objects is an un-Mac-like experience. You draw circles to receive objects, drag one object from the library into a circle, and then use the replace tool to duplicate that object in the other circles (the copy tool makes only one copy of an object). Then you drag the circles to where you want them in your garden, resize the objects to fit their designated spaces, and finally color them.

In sum, Expert Landscape Design provides a bare-bones drawing environment in which you can experiment with landscape design—moving images of plants and objects around a scalable area. The only instruction this program offers is a chapter at the back of the manual on elementary landscape design.—RITA LEWIS



My Garden Although drawn to scale, my garden is badly approximated in Expert Landscape Design, with only generic plant forms and no rocks for my rock garden. Note the open Tree Library and the kludgy color tools.

SCSI Monitor

ClearVue/SD21

PROS: Fast scrolling; uses little RAM. **CONS:** No mirroring mode; terminators difficult to access; does not display gray scale. **COMPANY:** RasterOps Corporation (408/562-4200). **REQUIRES:** Mac Plus; System 6.0.3 (7.0 for color Macs). **LIST PRICE:** $1799.

MW ★★

IMAGINE YOUR AUDIENCE IN RAPT attention to your presentation on a 21-inch display as you maneuver through your disk-based slide show or QuickTime movie from your PowerBook. That's the potential I envisioned for the RasterOps ClearVue/SD21 monitor, a monochrome display with a 21-inch screen that plugs into any Mac via the SCSI port (it's intended primarily for PowerBook users). Sadly, the reality is less than the potential.

The ClearVue/SD21 lets you display images in black and white, not gray scale, so chances are you won't be using it for any graphics-intensive work, whether for yourself or for a presentation to others. It also offers only the standard 1152-by-870-pixel resolution for 21-inch monitors—there's no option to switch to, say, 640 by 480 or 832 by 624—so you cannot use the monitor as a magnifying monitor for presenting text to an audience.

And even if it did let you do any of this, the ClearVue/SD21 does not support mirroring mode (also called presentation mode), in which the monitor displays the same image on the PowerBook screen as on the external monitor, so managing a live presentation is tricky unless you manage to position yourself so you can watch your PowerBook screen, the external monitor, *and* your audience.

Although the RasterOps monitor is nice, and the INIT that lets it run as a second, external monitor is easy to install and use, this product is limited in how it can be used. What can you do with it? Basically, you can work on large text files at a home or office setup where a PowerBook is your primary Mac. I don't think many word processing users need such a large monitor, and the number of Excel or Lotus 1-2-3 spreadsheets that need to be displayed at this size must surely be a small part of that universe.

The screen display is relatively speedy, thanks to the monitor's built-in graphics acceleration. I found the scrolling to be about as fast as that of a PowerBook 140's internal screen. Considering the amount of data that a large monitor must handle over a relatively inefficient path like SCSI, that's an accomplishment.

The INIT that controls the monitor takes only about 120K of RAM. In addition to intercepting the QuickDraw calls that are sent to the PowerBook's internal display, and sending calls on to the video board built into the ClearVue/SD21 monitor, the INIT can also be set to create an *extended desktop*, so you can pan across an even larger screen than can fit on a 21-inch monitor (see *Lab Notes*, this issue).

If only the ClearVue/SD21 supported gray scale, mirroring, and high resolution, many more users would benefit greatly from this monitor. With these additions, the $1799 ClearVue would be a good investment for graphic artists who want a portable Macintosh so they can take files to their clients, yet not be limited to a PowerBook's small screen while working on detailed artwork; or for businesspeople making presentations on the road or in a conference room. For use as a large, text-oriented screen, it would be hard to justify the investment, since you would pay about the same price for both a regular 19-inch gray-scale monitor and an Aura Systems (619/438-7730) ScuzzyView SCSI video adapter (see the feature "Expanding Your PowerBook," this issue), which together give you 8-bit gray-scale support, as well as color if you plug the adapter into a color display or LCD panel. (But, alas, no mirroring.)—GALEN GRUMAN

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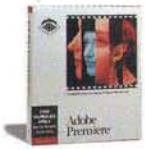

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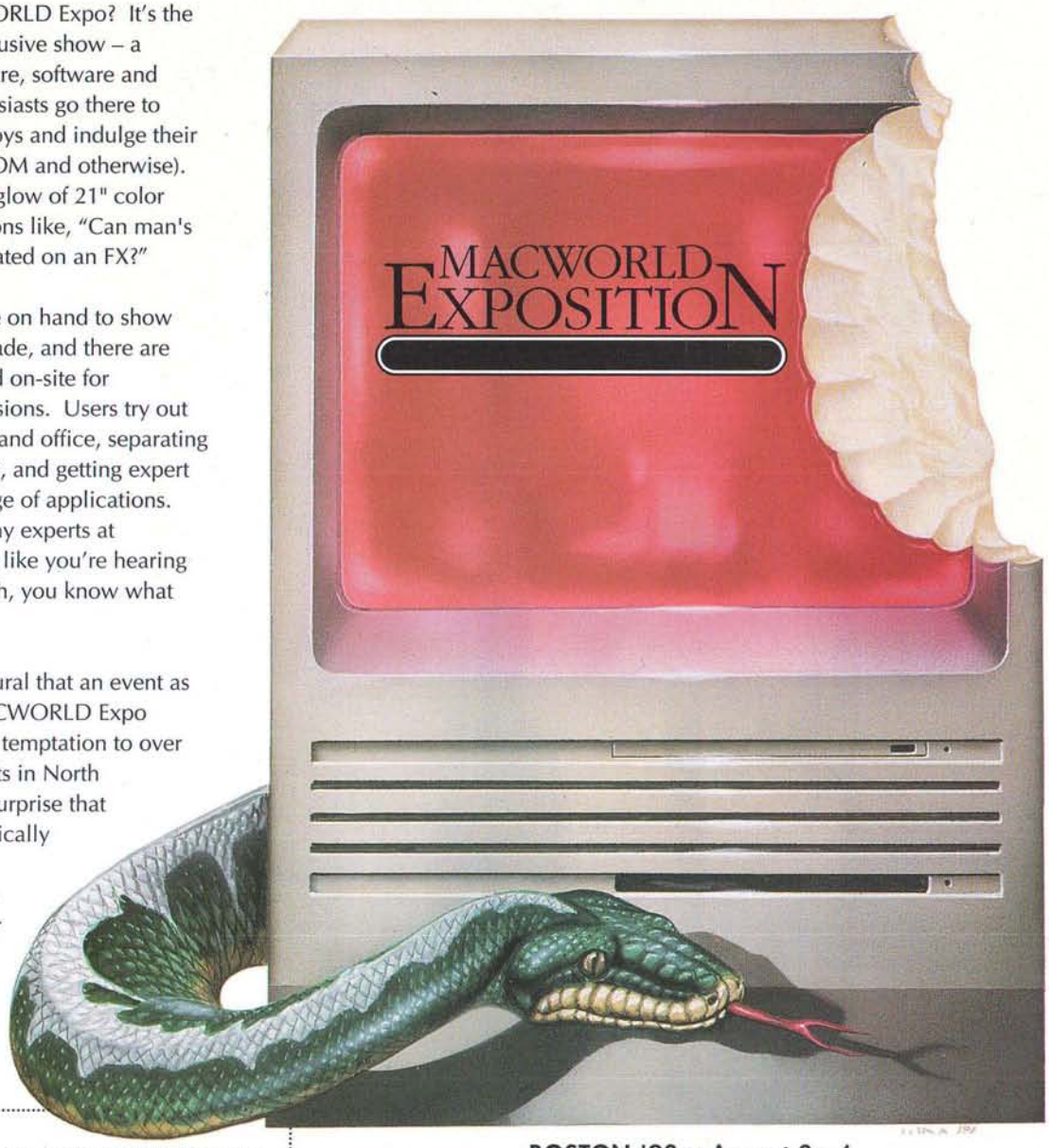
Qualified Macheads are on hand to show users the tricks of the trade, and there are plenty of Macs provided on-site for impromptu practice sessions. Users try out new software for home and office, separating the quick from the dead, and getting expert critiques on a wide range of applications. In fact, there are so many experts at MACWORLD Expo, it's like you're hearing the word of G...(well, uh, you know what we mean).

In the end, it's only natural that an event as big and exciting as MACWORLD Expo would be an irresistible temptation to over 100,000 Mac enthusiasts in North America. (And it's no surprise that companies would practically part with their ribs to exhibit). True believers know that glory is never more than an upgrade (or two) away. And sticking with the same old program is almost a sin.



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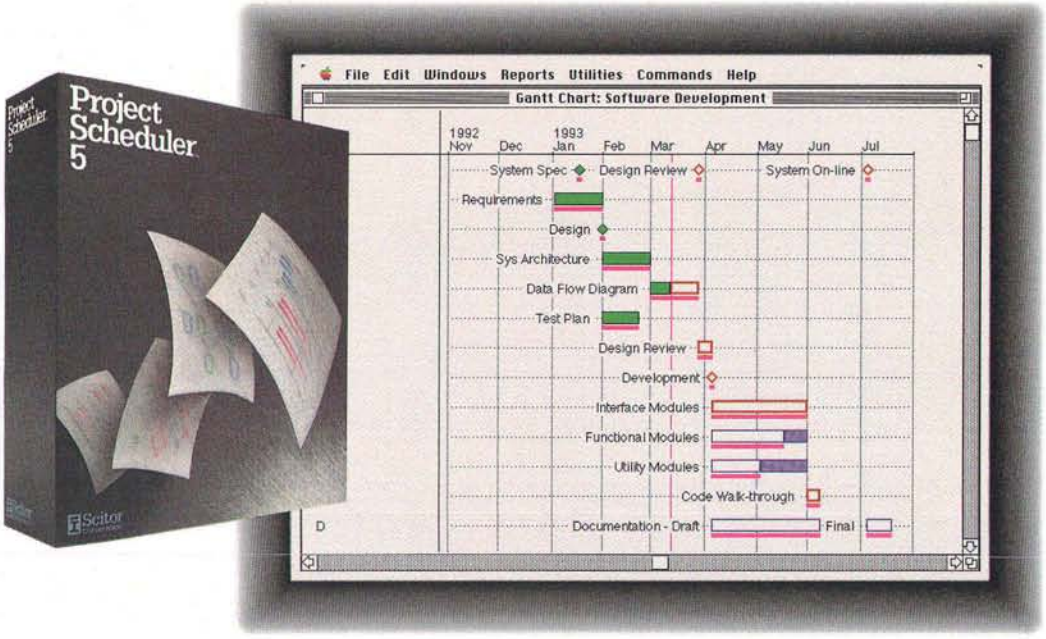

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Giants of Little Black Books

BY DAVID POGUE

AS I SEE IT, YOU HAVEN'T BEgun to use your Mac until you own two programs: a word processor and an address book. Oh, the bliss of little-black-book software! Oh, to dial a 93-digit credit-card sequence with one keystroke! To look up your client's kid's name before you've even finished saying "And how is little...?" To print mailing labels for only those deadbeats in zip code 10025 who owe you money!

There are two drastically different approaches to phone-book programs. Some show you a big blank card for each address. You can type information in any order, taking as much space as you want. One card might contain 11 phone numbers and no address at all; another might hold a recipe. This is the index-card model, the QuickDex protocol, the free-form database metaphor. These address books do everything fast: opening files, finding names, and saving changes.

The other kind of program has a separate fixed-length blank, or *field*, for each particle of info. First name. Last. City. State. Zip. Because the software knows precisely where each datum is socked away, it can perform stunts like sorting your entire phone book by car-phone number. Or printing labels for one specific state. Or alphabetizing your contact names. Field-based programs are slower, and you generally can't record information for which there's no preassigned blank (a car-phone fax number, say). On the other hand, the index-card programs generally can't sort or select individual pieces of information, nor print labels or envelopes that include only the address.

I say *generally* can't, because both kinds of programs have recently exhibited some ingenious schemes for solving their characteristic drawbacks. Index-card programs now print labels that exclude phone numbers and notes; field-based programs now offer spare blanks where you can store miscellaneous data scraps. As you read the following reviews, consider your character. Decide whether you'd prefer a program that lets you color outside the lines, so to speak, or you would feel more secure with every data fragment filed in a field.

AddressBook 3.4.1

WHAT DO YOU CALL A PROGRAM THAT lets you customize its color scheme, that automatically logs the amount of time you spend on each phone call, and that costs a third of what its rivals cost? You call it shareware—specifically, AddressBook. You get it from a user group or a dial-up network like America Online, try it out, and mail Canadian author Jim Leitch 30 bucks if you like his work.

AddressBook is both a program and a desk accessory (DA); both versions are fast and feature-rich. Its phone-directory main screen lists all your friends at once; double-click on a name to see a full screen showing address, phone number, and so on. If your phone is hooked to a modem (or to Sophisticated Circuits' Desktop Dialer), AddressBook's dialing smarts can handle preposterous touch-tone sequences (like credit-card access codes) with aplomb. (But like all programs except Advanced Software's Intouch and Casady & Greene's QuickDex, AddressBook maxes out when the dialing sequence exceeds 30 numbers, as my MCI card does.) AddressBook (the application, not the DA) prints great-looking labels, envelopes, and phone books. One feature in particular should embarrass the expensive commercial address books: automatic font resizing for addresses too large to fit on a label. You never *ever* get chopped-off mailing labels.

The burning question: Is AddressBook index-cardish or field-based? Happily, it's a clever hybrid. There are three blanks for each person (plus three phone-number blanks): one for the name, one for the complete address, and a third for miscellaneous notes. This scheme grants the incredible speed of index-card programs, while still isolating the stuff you wouldn't want printed on your envelopes (such as "chronic garlic breath").

The top 11 phone-book programs battle it out

Address Book Plus 2.0

DON'T CONFUSE ADDRESS Book Plus with AddressBook, its non-Plussed shareware namesake. This $99.95 program from Power Up Software takes full advantage of its field-based orientation: it sorts, selects, formats, and prints names and addresses in every conceivable way. You can assign contacts to a category ("Send Xmas Card") and print them all in a batch. Data entry is fast with typing shortcuts, such as autoexpansion of anything you start to type ("Ober") into its full form ("Oberüberammergau") and automatic capitalization.

By far the best aspect of AB+ is that you see on the screen precisely what you print—even the little binder holes in the paper (if you're printing Day Runner pages, for example). You get to spot problems before you print. AB+'s phone-dialing setup deftly handles multiple long-distance carriers and credit-card accounts, and automatically tacks on country codes when you're dialing overseas.

However, this what-you-see-is-what-you-get wonderworld is slow, especially when a file has more than 200 addresses. On a Mac IIci, it took 25 seconds to save a change to a 500-name file, and 30 seconds to switch from one layout display to another. On lesser-horsepower Macs, you might crave something quicker.

Dynodex 2.0.7

GREAT RIVALS OF HISTORY: CAPULET and Montague; Hatfield and McCoy; Dynodex and Address Book Plus. The last two have tried to out-feature each other for years; each manufacturer distributes a fact sheet pointing out its rival's shortcomings. Both programs are field-based. Both include a dialer/lookup DA. And both come with instructions for printing on both sides of pages so you can produce a pocket-size address book.

But Dynodex ($89.95; Portfolio Software) trades an attractive WYSIWYG screen display for speed. Where Address Book Plus gets sluggish for the sake of making WYS match WYG, Dynodex offers only an uneditable page preview just before you print. More annoying: you can't change the screen display typeface (the yucko Monaco font). And there's no balloon help to demystify the unlabeled tool icons. Still, speed is

continues

ADDRESS BOOK FEATURES

	AddressBook 3.4.1	Address Book Plus 2.0	Dynodex 2.0.7	Intouch 2.0.4	MacPhonebook 3.06
Company	Shareware Jim Leitch	PowerUp Software	Portfolio Software	Advanced Software	Synex
Telephone	NA	415/345-5900	408/252-0420	408/733-0745	718/499-6293
List price	$30	$99.95	$89.95	$99.95	$49.95
Phone dialing	●	●	●	●	●
Credit-card dialing	●*	●*	●*,†	●	●*,†
Imports/exports text files	●/●‡	●/●‡	●/●‡	●/●	●/●‡
Prints envelopes/lists/labels	●/●/●‡	●/●/●‡	●/●/●‡	●/●/●	○/●/●‡
Selectable fonts for screen for printout	●/●‖	●/●	○/●	●/●‖	○/●‖
Number of fields	6	21	22	2	6
Number of assignable categories	32	unlimited	unlimited	unlimited	8
Sorting options	by last name	by any field	by any field	by first name, last, zip, category	company name
Time to open a 500-name file in seconds	3**	21**	3	2	20

● = yes; ○ = no; NA = not applicable. * Up to 31 digits. † You can't override the credit-card dialing on a call-by-call basis. ‡ Only in application, not in the desk accessory.
** Desk accessory version tested.

good; we like speed. Dynodex is fast in opening, searching, and saving.

I looked at a prerelease version of Dynodex 3.0, which should be available by the time you read this. The interface is in color, but you stare at the same old Monaco font; and mailing-label addresses, if Dynodex thinks they're too long, still get chopped off without warning.

Intouch 2.0.4

NEVER LET IT BE SAID THAT AMERICA IS losing its technological edge. This brilliant DA/control panel ($99.95; Advanced Software), neatly solves the index-card-versus-field-database problem by giving you *two* free-form fields (for more about Intouch, see *Reviews*, in this issue). In one, you type what you want to have appear on the envelope. In the other, you put phone numbers and notes. You get the speed of the free-form programs without sacrificing envelope-printing ability. For example, on a IIci, a 500-card file takes four seconds to open, and the program finds a name about half a second after you click on Search. Alas, if the file is much bigger than that, Intouch runs out of memory headroom and has to read chunks of the file from your drive. Translation: It's slow.

Intouch dials even complicated sequences effortlessly, spewing touch-tones at a machine-gun clip. The program prints gorgeous envelopes, complete with bar codes. It also prints labels, phone books, and fax cover sheets. You can assign each name to a category (maybe "Call back" or "Potential dates"), then view or print only those addresses—a feature traditionally only in field-based databases.

There's still more (this is some DA!). For example, a reminder system pops a message onto your screen at an appointed time—and even displays the appropriate Intouch card, so that one click dials the person you were supposed to call.

Coolest of all, there's some kind of wild background-lookup magic that works in *any program*, even when Intouch isn't running. You highlight a person's name in, say, your Microsoft Word memo, and press a key. Intouch looks up the address behind the scenes, and, after about five seconds, plops the mailing address into your document. You can also *dial* somebody whose name you've highlighted in any program, or print an addressed envelope for that person. It's pretty spectacular, and no other program does it.

MacPhonebook 3.06

"BE MERCIFUL," SAID A SYNEX SPOKESman when I told him I'd be reviewing MacPhonebook. That's because this dialer/printer/address book program (and DA) is ancient and feature-poor. For mercy's sake, I'll simply mention that the new version in development, 4.0, is supposed to be polished and state-of-the-art.

Mail Dex 1.0.2

EVER HEAR PEOPLE SAY THAT WHEN they go to Andrew Lloyd Webber musicals, they walk *into* the theater humming the songs? You get that same sense of familiarity when you open Mail Dex, an index-card program ($59.95; Mission Accomplished Software Services). It's like QuickDex.

Anyway, despite Mail Dex's sole innovation—a nice envelope-layout view—I prefer the genuine article (QuickDex). I couldn't get Mail Dex to dial at all, and this DA from 1988 doesn't have nearly as many features or as much polish as its better-known, more modern look-alike.

MyMailList 4.0.0

IMAGINE A WORLD WHERE YOU CAN'T drag through text to select it; where ⌘-period (.) doesn't cancel; where you can make font changes to highlighted text, but you don't see the change until you print; where the company's own copy of the software bombs on the phone technician's Mac. This is the world of MyMailList ($59.95; MySoftware Company).

It gets weirder: there's neither a command, nor a button, nor instruction in the manual for adding a new entry to your address file. And are you ready for this? After two free calls, the company charges $7 per call for tech support.

PhoneBook DA 2.6.4

WHEN I WAS GROWING UP IN OHIO, MY family kept its phone numbers in a spring-loaded gadget Mom called a Metal Directory. You slid a clicky pointer along the side until it pointed at, say, letter *M;* then you pressed a tab and the Metal Directory's lid popped open to the *M* card.

The closest you can come to this classic analog database is Tim Herzog's polished, extremely fast PhoneBook program. It's shareware; the desk accessory version costs $35, and the application, PhoneBook Plus, and DA together cost $35. It works exactly like a Metal Directory—you click on a letter tab to pop to a screen of names beginning with that initial. It's more fun, though, to type the first few letters of somebody's name and watch the program zoom closer and closer to your target with each typed letter. It also does dialing and envelopes, creates beautiful phone-call logs, and can import 500 names-and-addresses in eight seconds.

Rolodesk 3.3

WHAT IS TIM ENDRES, SOME KIND OF saint? The guy writes a sweet, swift, 'swonderful QuickDex precursor with a witty title—and its's free. Download this index-card-style DA from a dial-up ser-

Mail Dex 1.0.2	MyMailList 4.0.0	PhoneBook DA 2.6.4	Rolodesk 3.3	Super QuickDex 2.58	TouchBase 2.0.1
Mission Accomplished Software Services	MySoftware Company	Shareware Tim Herzog	Freeware Tim Endres	Casady & Greene	After Hours Software
213/870-2441	415/325-9372	NA	NA	408/484-9228	818/780-2220
$59.95	$59.95	$35	free	$89.95	$125
○	○	●	○	●	●
○	○	●†	○	●	●*,+
●/●‡	●/●	●/●‡	○/○	●/●‡	●/●
●/○/●	●/●/●	●/●/○§	○/○/○	●/●/●§	●/●/●
●/●‖	○/●‖	●/●‖	●/○	●/●‖	○/●
1	72	6	1	1	20
#	#	#	#	#	2
none	any field	by last name, company	none	by first name, last, zip	by any field
2	2	3**	2	1	4

§ Prints envelopes from the DA; needs application for other printouts. *‖ Only one font for the entire address.* *# There's no category feature, but you can search for keywords.*

vice, and you don't owe Endres a penny.

You can change the type style. You can even change the size of the window (something even QuickDex doesn't permit). And—what's important—a 1000-name file opens in two seconds, and Rolodesk pulls up the name you're looking for before your pinkie is off the return key, even on slow Macs. Rolodesk does not, however, dial the phone or print; it's strictly an on-screen looker-upper. Thank you, good Tim, wherever you may be, for your 1986 creation that's still a contender.

Super QuickDex 2.58

QUICKDEX IS THE QUINTESSENTIAL INdex-card phone-book program ($89.95; Casady & Greene). Having read about its ancestors and heirs (Mail Dex, Rolodesk, and even Intouch), you know that QuickDex is terrifically fast. As with the others, you type only a few letters of a name—*stoc* for Admiral Stockdale, for example—and you instantly see that person's card. A second keystroke dials the phone.

Trouble was, you couldn't print labels or lists—not even an envelope. But the *Super* in Super QuickDex stands for two add-on programs that liberate your electronic list. (You can buy QuickDex II without the add-ons for $60). With a single keystroke, QuickElope, a DA, fires off an envelope addressed with the information you highlight in QuickDex (or copy from anywhere); with Background Printing turned on, QuickDex returns control of the Mac to you in four seconds. There's also a printing/sorting application called PrintDex. It's not as polished as Address Book Plus, but it works similarly—it shows an editable WYSIWYG display of your printout-to-be. If you add appropriate searchable keywords to the cards of your file ("Client," and so on), PrintDex can search, sort, and create subgroups of your QuickDex database almost as flexibly as field-based programs do. Like the shareware AddressBook, PrintDex shrewdly shrinks the type on labels that would otherwise be too long to fit.

This'll take a whole paragraph, but I must describe one life-changing aspect of QuickDex's auto-dialer. Revel in its brilliance: if you type an *X* in a phone number, QuickDex stops dialing at that spot, waits for you to tap any key, then continues dialing. For example, my QuickDex card for Fed Ex's computerized pickup service reads **800-654-0920×9999-9999-9×10025×1×1**. QuickDex dials the 800 number and stops; when I hear the greeting, I tap a key to make QuickDex blast away at my Fed Ex number (represented here by 9's). QuickDex pauses until I'm asked for my zip code (key tap), the number of packages (key tap), and if I'll be home (key tap). And consider the number of other times you're asked to dial touchtones on cue: for phone extensions, bank-by-phone services, credit-card calls. QuickDex is the consumer's sole defense against Creeping Voice Mail in America.

TouchBase 2.0.1

TOUCHBASE ($125; AFTER HOURS SOFTware), a field-based directory, has a structure in common with Dynodex: you fill in 20 individual blanks (city, state, zip, and so on) for each person. The program can display either an individual data-entry screen or all of your contacts in a scrolling list.

TouchBase differs from Dynodex, however, in two major ways: first, it's far simpler. Every dialog box, menu, and window element is neat and elegant, and there are no mystery icons. But second, TouchBase is much slower than Dynodex. In a 500-name test file, TouchBase accessed the hard drive—slowly—and repainted the screen after almost every operation, from resizing the window to closing a dialog box. In particular, finding a certain record is slow and—compared with other programs—involves too many steps. On the other hand, TouchBase is twice as easy to learn as the other field-based programs. Furthermore, it is one of the few network-sharable address book you can buy.

The Upshot

IF YOU NEED THE POWERS OF A BONA fide database, choose DynoDex for its speed. Or consider a true database that dials, like ProVue's Panorama or Claris's FileMaker Pro.

I must admit, however, that I can't live with the rigidity of field-based programs. Today I wanted to write down, next to a phone number, "Fax/modem line—notify before faxing!" No field-based program allows such a notation. True enough, field-based programs can find subsets of your contacts by (for example) street address or state. Intouch and QuickDex can only search or sort by first name, last name, zip code, or category (or keyword). If that's enough for you, then the speed and flexibility of these desk accessories blow away all other filing systems.

Both QuickDex and Intouch also dial superbly, let *you* choose a font and layout for your contact information, and are fast. Intouch is more integrated (QuickDex's printing and sorting features are split off into a separate program). But give me QuickDex. Its auto-label-sizing, voice mail–blasting, and speed advantage over all comers make it addictive and fun—which is something I rarely said about our Metal Directory. **m**

Contributing editor DAVID POGUE is the author of the best-selling *Macs for Dummies* (IDG Books Worldwide, 1992). He wishes somebody would type the Manhattan phone book into QuickDex.

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Circle 146 on reader service card

New Products

The Latest Macintosh Releases

EDITED BY CAROLYN BICKFORD

THIS SECTION COVERS MACINTOSH PRODUCTS FORMALLY ANNOUNCED BUT NOT YET EVALUATED BY MACWORLD. ALL PRICES ARE SUGGESTED RETAIL. PLEASE CALL VENDORS FOR INFORMATION ON AVAILABILITY.

HARDWARE

AE Floptical Drive
External high-density 3.5-inch floppy drive that formats, reads, and writes to 21MB floptical disks, 1.44MB high-density Macintosh disks, as well as two-sided and high-density MS-DOS formatted disks. Bundled with Insignia Solutions' AccessPC, which allows users to format, read, and write MS-DOS disks. Includes SCSI cable and one floptical disk. 2MB min. memory. $513. Applied Engineering, 214/241-6060, 800/554-6227; fax 214/484-1365.

AE Floptical Drive

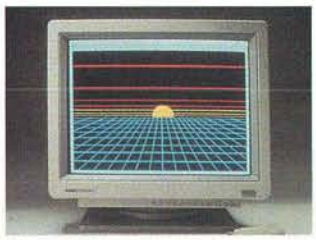
CDC-435
CD ROM drive features CD-audio play capability as well, with software, headphone jack with volume control, built-in RCA audio jack, and DIP-switch termination. The drive also has 12-function audio remote control with buttons for play, pause, stop, fast forward, reverse, random play, play introduction only, repeat single track, and repeat all tracks. Average digital-data-access speed is 350ms, according to company. $895. Chinon America, 310/533-0274, 800/441-0222; fax 310/533-1727.

CDC-435

Companion 80 and 120
External drives for the PowerBook that run up to four hours on their own batteries. Each drive comes with Companion INIT, which allows the drive to respond to the PowerBook's Sleep command. Drives also come with AC charger/adapter and SCSI cable. They store up to 80MB and 120MB of data, respectively. Companion 80 $499; Companion 120 $599. APS Technologies, 816/478-8300, 800/235-2752; fax 816/478-4596.

DiamondColor Print 300PS
Color dye-sublimation printer produces photographic-quality output at 100 seconds per page, according to the company. Printer has color-correction controls on front panel, 32MB full-page buffer, 14MB of RAM, and a 40MB internal hard drive. Comes with 35 fonts and AppleTalk and provides Ethertalk ports as well as parallel and serial ports. $10,995. Mitsubishi Electronics America, 714/220-2500, 800/843-2515; fax 714/236-6272.

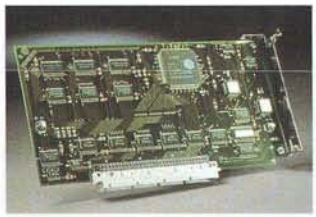
Expanse NB4 and Expanse NB8
These two external expansion chassis house four or eight additional NuBus slots, respectively, for the Quadra 950. Both chassis connect to the Quadra via a NuBus interface board and cable and contain their own power supplies. Expanse NB4 $1295; Expanse NB8 $2295. Second Wave, 512/343-9661; fax 512/343-9663.


Flexscan F750i

Flexscan F750i
A 21-inch color monitor that displays noninterlaced, flicker-free images at resolutions up to 1280 by 1024 pixels at 74Hz, and 1024 by 768 pixels at 90Hz, according to the company. Controls are located at the front of the monitor. Microprocessor can recall up to 32 different signals. Meets Swedish MPR-II ELF-emission guidelines, according to company. $3299. Nanao USA Corp., 310/325-5202, 800/800-5202; fax 310/530-1679.

INT-128
Rewritable, removable internal optical drive stores up to 128MB of rewritable data on magneto-optical disks; one disk is included. Seek time is less than 45ms, and data-transfer rate is 640 KBps, according to the company. $947. Image Network Technology, 818/454-1617, 800/334-6684; fax 818/454-1655.

JX-610
Flatbed 36-bit color scanner offers 600 by 1200 dpi, with single-pass scanning and software control for lightness, sharpness, negative scanning, and gamma-correction control. Can scan reflective and transparent original as large as 12 by 17 inches and as small as 35mm slides. $13,500 with software; $12,500 without software. Sharp Electronics Corp., 201/529-8731, 800/237-4277; fax 201/529-9636.


Mirror Quick

Mirror Quick
JPEG (Joint Photographic Experts Group) accelerator board compresses and decompresses images transparently for QuickTime applications. Mac IIcx with board opens compressed 1.2MB Photoshop PICT in 1½ seconds that would take 21 seconds to decompress without board, according to the company. $599. Mirror Technologies, 612/633-4450, 800/654-5294; fax 612/633-3136.

MultiVision 875 Plus
A 17-inch color monitor that has an on-screen programmable processor, 110V/220V power supply, side-panel user controls, and a two-year warranty. Monitor features 120MHz bandwidth, dynamic beam focus, and horizontal and vertical scan circuitry. $1899. Taxan, 408/748-0900, 800/648-2926; fax 408/748-9599.

MultiVision 875 Plus

PB-10
External video adapter that connects PowerBook 140, 145, or 170 to LCD panel or other projection device. Converts PowerBook's 1-bit video to VGA. No software needed. $399. Power R, 206/547-8000, 800/729-6970; fax 206/285-0260.

Personal Color-Point PSE
Thermal-transfer color printer has 300-by-300-dpi resolution; 5MB of RAM, expandable to 21MB; and 17 fonts. Uses 16MHz Intel 80960 RISC processor. Prints standard 8½-by-11-inch letter and 8½-by-14-inch legal page sizes; postcard size, and 210mm-by-297mm (A4) size. Can print full-color page in 2 minutes, 38 seconds, according to company. $3999. Seiko Instruments USA, 408/922-5900, 800/888-0817; fax 408/922-5835.

PowerPlay

PowerPlay
A 15-inch monochrome portrait display that connects to a PowerBook via the SCSI port; no special video adapter required. Designed with built-in 20MHz 68000 microprocessor and on-board QuickDraw acceleration. Also features a screen-refresh rate of 72Hz, resolution of 640 by 870 pixels at 80 dpi, two SCSI ports, and external SCSI-address and SCSI-termination switches. Also connects to Mac Plus or Classic. $999. Generation Systems, 612/633-5222, 800/325-5811; fax 612/633-1083.

PowerSwap
PowerBook accessory enables users of the 140, 145, 160, 170, and 180 to swap batteries without having to shut down the computer; device allows a standard 9V alkaline battery to power the Power-

continues

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Circle 207 on reader service card

Book while the computer sleeps to preserve RAM contents. $39.95. Utilitron, 214/727-2329, 800/428-8766; fax 214/727-2329.

PowerVision
This internal video adapter enables user to connect a PowerBook 140, 145, or 170 to a standard 12-inch, 13-inch, or 14-inch color monitor or to a 15-inch gray-scale monitor. Display-detection circuitry deactivates the video board when monitor is disconnected. Includes installation video and tools. Without RAM $499; with 2MB of RAM $699; with 4MB of RAM $999. Mirror Technologies, 612/633-4450, 800/654-5294; fax 612/633-3136.

PowerVision

ViperDrive
Floptical drive that reads and writes to 3.5-inch flopticals, high-density (1.44MB) Mac or DOS disks, and two-sided DOS disks. Internal configurations support the Mac II family, the LC and LC II, and the SE and SE/30. Also available as an external floppy drive. Ships with SCSI cable and floptical disk. Internal $349; external $399. Second Wave, 512/343-9661; fax 512/343-9663.

Wacom UD-0608
Pressure-sensitive ADB graphics tablet that has the ability to distinguish 120 levels of pressure, twice that of the original Wacom tablets, according to the company. The tablet also recognizes more than 100 data-input points per second, as compared with top input speeds of 50 to 60 points per second for conventional ADB tablets, according to company. $449. Wacom Technology Corp., 206/750-8882, 800/922-6613; fax 206/750-8924.

SOFTWARE

Accents & Borders 2
Modular clip-art collection that includes more than 300 decorative and representational images, some of which were inspired by historical motifs, such as Native American and Celtic art. There are five categories: borders, which are designed to be scaled, cropped, duplicated, and linked together; frames, designed for proportional scaling when imported into a page-layout program; ornaments, which can be used alone or duplicated to create borders and frames; symbols, made up of several images that can be separated and used independently; and tiles, designed to be repeated horizontally and vertically to create continuous background patterns. 2MB rec-ommended. $149.95. 3G Graphics, 206/774-3518, 800/456-0234; fax 206/771-8975.

Accents & Borders 2

Bestbooks by Teleware
Entry-level bookkeeping product for small businesses. Provides sample data files covering almost every type of business: check, deposit, invoice, and purchase-entry screens; automatic entry balancing; both item and service invoicing; and integrated draw program to customize checks, invoices, statements, and mailing labels. Product is data-compatible with M.Y.O.B. accounting software. 1MB min. memory. $99. Teleware, 201/586-2200, 800/322-6962; fax 201/586-8885.

Bridge 7.0
Bridge-playing program deals the opening hand, bids and plays out a hand, recognizes Blackwood and Stayman conventions, lets the player choose weak or strong two bids, saves and replays hands; the Hand Editor lets the player set up, swap, or modify hands. The hint button suggests bids along with a reason for making bids. Player can set bidding style to be more aggressive or conservative. Players can also choose to play contract or duplicate bridge or whist. 1MB min. memory. $49.95. Artworx Software, 716/385-6120, 800/828-6573; fax 716/385-1603.

Christmas Pack
Collection of 15 games with a holiday theme; includes picture puzzles, word searches, matching games, and strategy and memory games for one or two players. Rather than pulling down menus, users access each game by clicking on presents or stockings in a holiday picture on screen. Sound is a part of each game as well. 1MB min. memory. $59.95. Nordic Software, 402/488-5086; fax 402/488-2914.

ClickArt Artistry & Borders
Clip art collection of more than 325 EPS images. Consists of more than 60 borders; people, business, flower and animal pictures; labels; and initial capital letters. 2MB min. memory. $129.95. T/Maker Company, 415/962-0195; fax 415/962-0201.

Cliptures Volume 5 Borders
Collection of more than 300 EPS clip art border styles including art deco, art nouveau, calligraphic, certificate, contemporary, and Victorian. 1MB min. memory. $129.95. Dream Maker Software, 303/762-1001, 800/876-5665; fax 303/762-0762.

Cogito
Player must restore a geometric figure of marbles, which are randomly mixed by the computer, to its original shape by moving rows and columns on the board. Game has 120 levels of difficulty. In color with optional background music. 2MB

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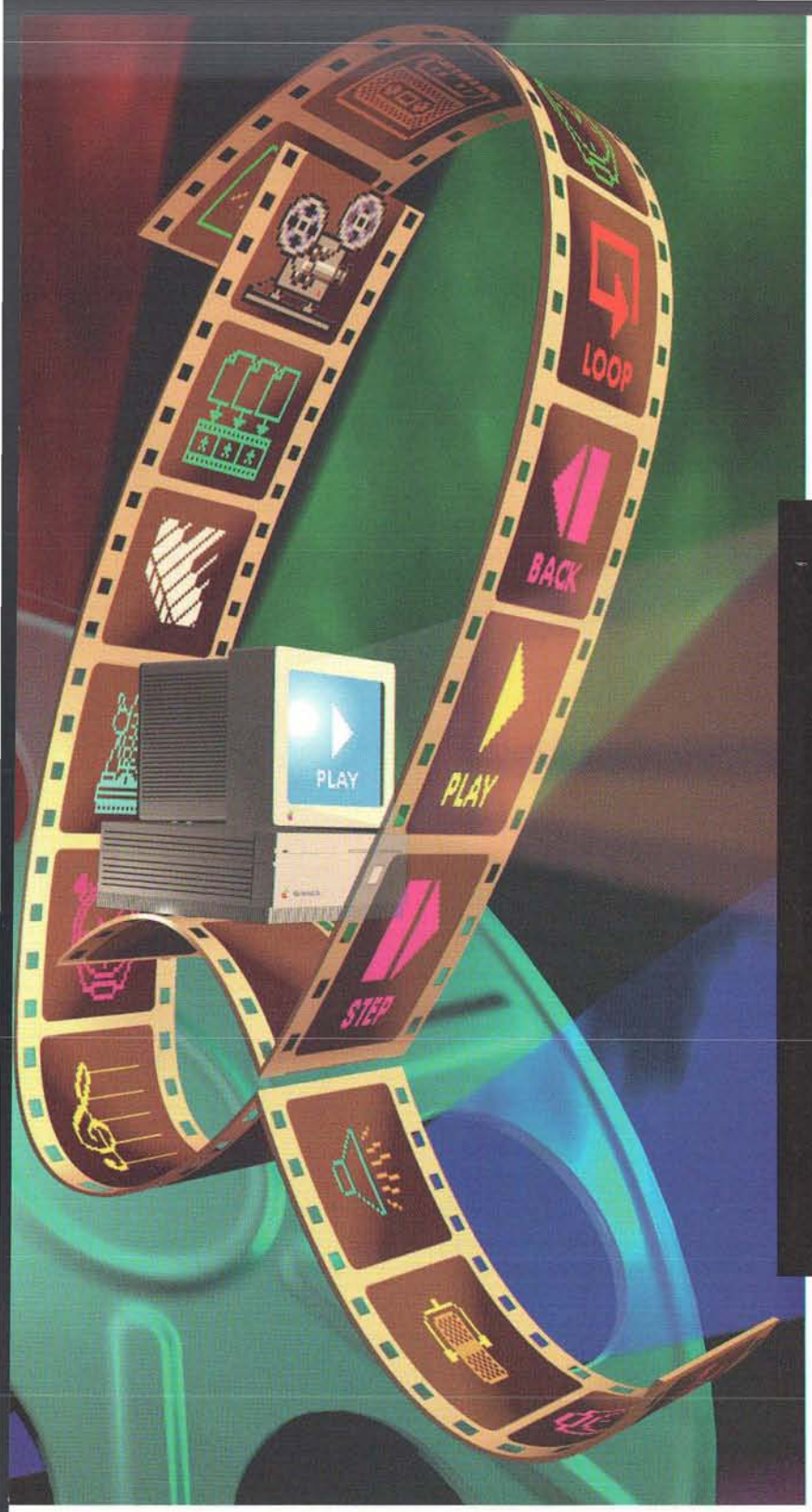

International QuickTime & Multimedia Conference

March 1 & 2, 1993
Fairmont Hotel, San Francisco

The International QuickTime and Multimedia conference is a two-day celebration of QuickTime and multimedia for professional and in-house Apple Multimedia Program developers, film and video producers, and Macintosh users, cosponsored by Apple Computer, Inc., and Sumeria, Inc.

Sessions

Technology tracks will cover in-depth sessions including how to make a QuickTime movie, cameras, compression technology, making your own CD, utilities, digital video applications, analog editing, digital editing, music, sound, digitizing, animation, 3-D, special effects, interactive games, and authoring. Business of multimedia tracks include introduction to Apple Multimedia Program, Mac market overview, channels for multimedia, cross-platform issues, working with Apple market centers and sales reps, and reaching your market.

Exhibition

More than 35 exhibits will provide demonstrations of QuickTime applications, monitors, cameras, editing systems, CD ROM development systems, digitizers, and other QuickTime-related technology.

Hands-On Video Editing Seminar

SuperMac Technology and Adobe Systems will present a hands-on training room where you can learn about digitizing, editing, and output full screen, full-motion, digital video on the desktop using Adobe Premiere 2.0 and SuperMac DigitalFilm.

Tutorials

Three two-hour tutorials will be held on Sunday, February 28, covering introductions to QuickTime, sound, and capturing movies. These tutorials are intended for people who need a basic introduction to these topics and for nontechnical people who want to attend the advanced-technology sessions in the conference.

The QuickTime International Film Festival

Cosponsored by Sumeria, Macworld Japan, and Apple Computer. The QuickTime International Film Festival in the United States is hosted by Michael Backes of the American Film Institute's Apple Computer Center for Film and Video Makers. The QuickTime International Film Festival in Tokyo will be hosted by Jerry Borrell, editor in chief of Macworld Interactive. Entries for both festivals must be submitted to Sumeria by January 15, 1993; for details and entry form, contact 415/904-0808.

International Film Festival Tokyo
Makahari Messi in conjunction with the Tokyo Macworld Expo
February 10, 1993

International Film Festival San Francisco
Fairmont Hotel, San Francisco
March 1,1993 — attendees of the conference
March 2, 1993 — open to the public

REGISTRATION

- $495 CONFERENCE PROGRAM
  (INCLUDES SESSIONS, EXHIBITS, CONFERENCE MATERIALS, COFFEE BREAKS, AND FILM FESTIVAL)
- $249 CONFERENCE PROGRAM (MEMBERS OF APPLE MULTIMEDIA PROGRAM)
- $95 TUTORIALS SUNDAY, FEBRUARY 28 (SEPARATE FEE)

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FAX YOUR CREDIT CARD NUMBER (VISA OR MASTERCARD), ITS EXPIRATION DATE, AND THE NAME ON THE CARD TO SUMERIA, AT 415/904-0888, OR MAIL YOUR PAYMENT TO SUMERIA. CHECKS SHOULD BE MADE PAYABLE TO SUMERIA, INC., AND SENT TO: SANDY BUTLER, EVENTS MANAGER, SUMERIA, INC., 329 BRYANT STREET, SUITE 3D, SAN FRANCISCO, CA 94107. FOR ADDITIONAL INFORMATION, CONTACT SUMERIA AT 415/904-0808; FAX 415/904-0888.

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Steven Bobker, MacUser 6/92

	NISUS® COMPACT	WriteNow® 3.0
Suggested Retail Price	$150	$245
Toll-Free Tech Support	Yes	—
Uses Claris® XTND to Read/Write MS® Word	Yes	Yes
POWERBOOK FEATURES:		
Battery Status & Clock Display	Yes	—
Sleep Command Within Program	Yes	—
Battery Conservation	Yes	—
Thick Cursor & Insertion Point Preference	Yes	—
EDITING FEATURES:		
Headers/Footers	Yes	Yes
Paragraph Style	Yes	Yes
Footnotes	Yes	Yes
Custom Keyboard Equivalents	Yes	—
Unlimited Undos	Yes	—
Noncontiguous Selection	Yes	—
Rectangular (Vertical) Selection	Yes	—
File Management & Retrieval System	Yes	—
Graphics Layer	Yes	—
SPELL CHECKER:		
Words	135,000	135,000
User Dictionary	Yes	Yes
Skip/Replace All	Yes	—
Auto Hyphenation	Yes	—
Thesaurus Words	1.4 Million	1.4 Million
FIND/REPLACE FEATURES:		
Find All	Yes	—
Wild Cards	5	1
Font, Size, Style, Color Sensitive	Yes	—
Phonetic Find	Yes	—

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Circle 289 on reader service card

min. memory. $59.95. Inline Design, 203/435-4995, 800/453-7671; fax 203/435-1091.

CompassPoint
Image-management system that catalogs and manages photos, slides, overhead transparencies, illustrations, and QuickTime movies. The program includes a feature that automatically tracks where and when images have been used and where they are currently filed or who has borrowed them. Also has remote-access capability that allows authorized off-site users to browse and download images. 6MB min. memory. $749. Northpoint, 313/543-1770; fax 313/541-1858.

CompassPoint

The Complete Stories, Volume 1
Expanded book for PowerBook brings 46 of Isaac Asimov's stories to the laptop. Users can annotate passages, mark text, search references, and set bookmarks. Requires HyperCard 2.1. 2MB min. memory. $19.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

Contractor's Dream
Construction-estimate program has database for labor-and-materials costs, sorts by task or material description, gives the contractor four types of bids, accumulates bids, saves jobs, and calculates percent waste. Works in feet, inches, fractions of an inch, and pitch; and can update bids or database by percentages. Includes 30-minute tutorial tape cassette. 2MB min. memory. $475. Workhorses, 303/279-8551, 800/777-2477; fax 303/279-0411.

Country Club Art
Over 175 images of golf- and tennis-related clip art in HyperCard and MacPaint formats. Requires HyperCard or MacPaint. 1MB min. memory. $44.95. FYI Publishing, 817/732-1521; no fax.

Datica
Tool for converting physical measurements; allows users to convert between English and metric systems and independent units. The program can solve 50 fundamental equations with variables in any units. Includes periodic table with the 10 most-used properties for each of 103 elements; a library feature allows user to add data about other measurement types. 512K min. memory. $65. By Design, 414/648-3712, 800/527-7472; fax 414/648-3712.

Dear Diary
Journal program that enables user to take extensive notes and organize them in a database-like way; includes a built-in personal information manager, appointment calendar, to-do list, and date-stamping capability; designed particularly for the purpose of tracking telephone and in-person conversations. 1MB min. memory. $69.95. Purrfect Software, 602/967-0097; no fax.

The Educator's Time Source
Computerized grade book, database, search-and-report generator, assignment-key generator, and test-scoring and grade-posting program. Helps educators keep track of grades and associated clerical work. Tracks up to 50 students per class, and up to 15 classes. 1MB min. memory. $125. Missing Link Technologies, 503/259-2882, 800/833-5790; no fax.

EduClip Images 1, 2, & 3
EPS clip art for use in materials relating to education. EduClip Images 1 includes clip art images for school sports, classrooms, holidays, and various curriculum areas. EduClip Images 2 includes alphabet with different images for each letter and the numbers 0 through 10. EduClip Images 3 includes logos for different curriculum areas and symbols for subjects such as biology, chemistry, health, music, literature, foreign languages, and geography. 2MB min. memory. $39.95 per title. Teach Yourself by Computer Software, 716/381-5450, 800/724-4691; fax 716/427-7628.

Exam in a Can
Generates objective-based math exams, tests, and worksheets for grade levels 4 through 12. Algorithm bank attaches an algorithm to each predefined curriculum objective and then generates as many problems for that objective as teacher requires. Teacher can also enter questions. Questions can be multiple choice or free response. Titles include Basic Math, Applications in Basic Math, Pre-Algebra, Algebra I Skills, Algebra II Skills, Geometry, Pre-Calculus and Calculus. 1MB min. memory. $499 per title. Chancery Software, 604/294-1233, 800/999-9931 ext. 180; fax 604/294-2225.

Handcrafted Type Designs
Original and revived set of typefaces includes Metroliner Caps (originally known as Metropolis Shaded typeface), Jm Eden Light, Antique Row, Spring Garden, and Exposition. 1MB min. memory. $89. Jonathan Macagba, 215/829-1558; fax 215/829-1512.

Handcrafted Type Designs

Human Envelopes
Envelope-and-label utility that features preset support for 28 types of envelopes and labels, provides 9 database fields for each address, dials telephone numbers, *continues*

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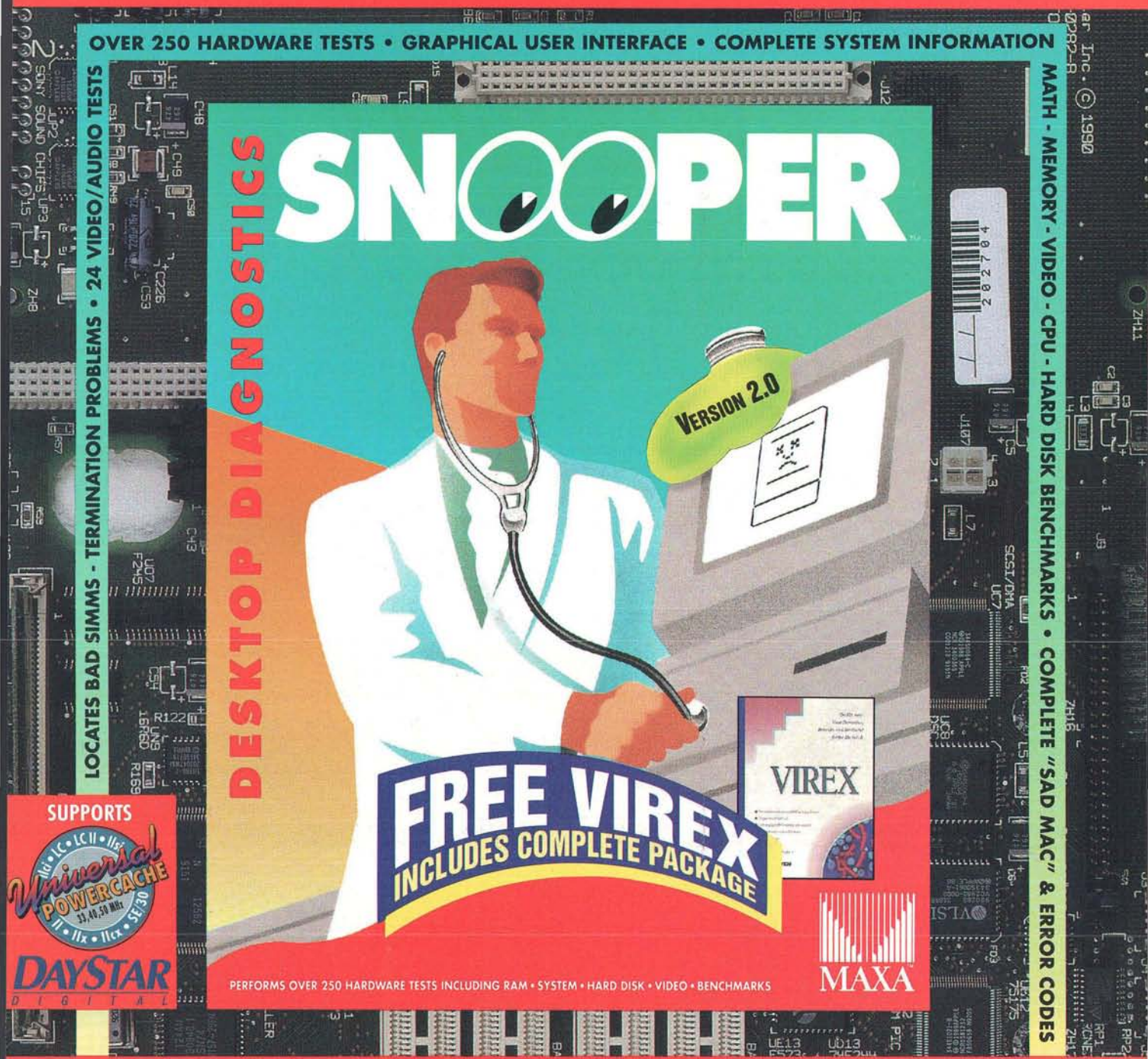

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sorts on 11 criteria, and finds across all fields; lets the user view a database by any field, add graphics, and do quick cut and paste from word processors; and offers online help, postal information, and wide-area bar codes. The Open House feature searches a hard drive for previously typed addresses and enters them in the Human Envelopes database. Program can import 19 different file formats, including Word 3 and 4, Works, MacWrite 5.0 and II, and WordPerfect. 1MB min. memory. $124.95. We, 415/368-0828, 800/452-2635; fax 415/858-2598.

Imploder 2.0
External development system for 4th Dimension database applications; compresses data up to 85 percent, according to the company, without any modification or removal of data from image or document. 2MB min. memory. $249. Component Software Industries Corp., 609/497-4501, 800/633-4252; fax 609/497-4008.

Jam Session
Program includes 20 popular songs, such as Peter Gabriel's "Sledgehammer," Ritchie Valens' "La Bamba," Elton John's "Crocodile Rock," and Garth Brooks' "Rodeo"—all without vocals. Users can change a sound's instrumentation and jam along, even record alongside, with their own MIDI instrument or with an on-screen keyboard. 1MB min. memory. $59.95. Bogas Productions, 415/592-5129; fax 415/592-5129.

Japanese Word Torture
Program drills user on 2014 Japanese words, based on the list of essential words formulated by the Japanese Language Institute. Learner builds vocabulary by typing in hiragana or katakana without running the KanjiTalk operating system. The program does not display Japanese words in romaji. 2MB min. memory. $49.95. HyperGlot Software, 615/558-8270, 800/726-5087; fax 615/588-6569.

The Modern Concrete Estimator
Templates and databases that use Microsoft Excel 4.0 for concrete estimating for residential through light industrial construction. Areas for concrete estimation include foundations, cast-in-place structures, and flat work. Templates can handle information to calculate materials, labor, and indirect labor costs. Has ability to report on material cost per yard, labor cost per yard, material cost per square foot, and time remaining to completion. 2MB min. memory. $150. Rock St. Software, 805/653-5462; fax 805/652-0742.

Orchids
Program designed to manage the flow of medical clinic data. Features include formats for entering medical history or notes of physical examinations and follow-up visits; picture files for patients' photo, X rays, surgical photos, and medical sketches; customized scrolling checklists for histories and physicals; customized automated letters generated from

Orchids

the checklists; a contact log for identifying and reviewing interactions with patients; a chart-review format for cross-referencing information; a report generator for extracting and relating data and performing statistical analyses; and password protection. 5MB min. memory. $4995. CapMed, 205/881-8620; fax 205/883-9717.

The Pelican Brief
A mystery story by John Grisham in Expanded Book form, designed for the PowerBook. A law student uncovers clues leading to the assassin of two Supreme Court justices. Users can mark passages, write notes, set bookmarks, and search text for specific references. Requires HyperCard 2.1 or later. 2MB min. memory. $19.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

Real Answer
Shareware math application includes algebraic calculator that supports trigonometric and transcendental functions, and named variables. Flex-Calc feature allows the user to modify an expression previously submitted for evaluation and to receive an answer without disturbing the historical record of mathematical query and response. Also solves sets of simultaneous linear or nonlinear algebraic equations. 512K min. memory. $20. ARSoftware, 301/459-3773, 800/257-0073; fax 301/459-3776.

ReOpt
Electronic encyclopedia of remedial-action options for hazardous-waste containment; features summary descriptions of 88 remedial-action technologies and 214 synonymous terms. Lists about 500 previous applications of cleanup technologies, including the company performing the cleanup and the status of the operation. Automatic technology selection allows user to choose appropriate technologies based on site characteristics. 5MB min. memory. $2500. Sierra Geophysics, 206/822-5200, 800/826-7644, ext. 120; fax 206/827-3893.

Sailor Song
Fiction by Ken Kesey; this Expanded Book designed for the PowerBook focuses on the inhabitants of an Alaskan town who have to deal with the environmental changes that are brought on by a Hollywood production company filming a children's story. Users can search text to find and annotate passages, mark passages, and set bookmarks for future ref-

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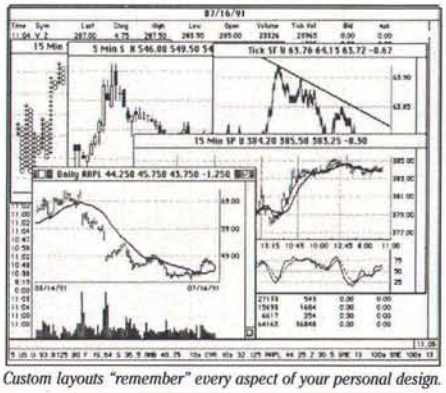
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While other drives may deliver fast access times or claim to conform to ISO/ANSI standards, *no* other high capacity optical on the market today can provide outstanding price/performance, true compatibility *and* offer an internal model for the Quadra 900s. With 650MBs of reliable optical storage ensuring 15 years of data integrity, a 40ms access time and an unbelievable list price of $2199, it's now time to reevaluate your technology of choice for removable storage. When you add Microtech's commitment to quality, FCC Class B compliance and leading service and support, the Genesis 650 is the breakthrough you've been waiting for in optical technology.

Manufacturer	Microtech	MicroNet	Ricoh	PLI
External Model	Genesis 650	SB SMO-1	RS9200EX	MaxOptical
Internal Model	Genesis 650i	none	none	none
Capacity	650MB	650MB	650MB	650MB/1GB
Access Time	40ms	95ms	37ms	35ms
Mechanism	Sharp	Sony	Ricoh	Maxoptix
Warranty	2 year	1 year	1 year	1 year
List Price	$2199	$3995	$3900	$4599

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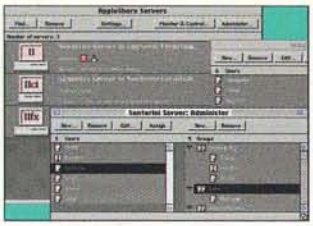
Circle 254 on reader service card

erence. Requires HyperCard 2.1. 2MB min. memory. $19.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

The Secret Island of Dr. Quandary
In order to escape Dr. Quandary's island, players need to solve puzzles using math and logic skills. Game has three difficulty levels. 1MB min. memory. $49.95. MECC, 612/569-1529, 800/685-6322 ext. 549; fax 612/569-1551.

The Secret Island of Dr. Quandary

Server Manager
Network-management software that allows network administrators to monitor, control, and administrate multiple AppleShare file servers from a single location. Program tracks and pinpoints problems such as back-up failures, network clock-synchronization problems, excessive server and node activity levels, impending disk-space shortages, and viruses. Records server and node usage levels over periods of time. 2MB min. memory. 1-pack $395; 5-pack $695; 10-pack $995; 20-pack $1495. Santorini Consulting & Design, 415/563-6398; fax 415/563-0332.



Server Manager

Spiral
Application designed for taking and organizing notes on a PowerBook; uses notebook metaphor. User creates notebooks consisting of text pages the size of the PowerBook screen. Users can divide each notebook into sections and attach bookmarks to specific pages in each section. Users can also enter shortened versions of words or phrases, which the program then writes out in full. Program loads itself directly into memory in order to avoid spinning up the hard drive, thus saving battery power. Program also includes optional fat I-beam cursor for easy viewing and a Sleep command that's accessible from within the program. 1MB min. memory. $129. TechWorks, 512/794-8533, 800/688-7466; fax 512/794-8520.

Swamp Gas Visits Europe
An extraterrestrial creature, guided by the player, visits countries, capitals, and points of interest in Europe. When a mission of visiting a certain number of countries, capitals, cities, and landmarks is complete, the player can choose to play one of three arcade games. For ages 6 and up. Game has three difficulty levels. 2MB min. memory. $59.95. Inline Design, 203/435-4995, 800/453-7671; fax 203/435-1091.

SymArt Pro
Software designed to administer prepress production of bar-codes. Enables user to design custom bar-code formats with up to five lines of text in any position and in any font, to store and name formats in a database, and to save bar codes in a print queue and print them simultaneously without opening them in other applications. 2MB min. memory. $2999. Bar Code Systems, 404/399-5921, 800/883-8300; fax 404/399-7837.

Target Tones System
Adobe Photoshop plug-in that helps user select and specify duotones, tritones, and quadtones. Guidebook offers more than 120 multitone variations; user selects reference number by sample in guidebook that corresponds to appropriate curve in Photoshop. 2MB min. memory. $99.95. Graphic Systems Technology, 606/283-9750, 800/528-1851; fax 606/283-9769.

Target Tones System

The Tinies
Tinies, which are mischievous, hairy beings from the planet Sklumph, are coming to Earth to play some practical tricks. Player has to find the Tinies and maneuver them back into their sleep pods. Game has more than 100 difficulty levels. 2MB min. memory. $59.95. Inline Design, 203/435-4995, 800/453-7671; fax 203/435-1091.

The Tinies

Trivial Pursuit Daily Planner
Sports edition tests users' knowledge of sports trivia daily in such categories as nicknames, football, all-stars, hockey, baseball, and numbers. Program keeps score of successful answers throughout the year. Comes with a Genus edition of the trivia game, for which user answers questions in the categories of science and nature, art and literature, history, geography, entertainment, and sports and lei-

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- *FinderExpress:* Increases Finder file copy speeds by up to 340%
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IIci 15.0MB/min
Quadra 700 29.9MB/min
IIci using FinderExpress 51.7MB/min
Finder copy test average of one 32MB file and 32 item 32MB folder
IIci and Quadra configured with System 7.1, 20MB RAM and DEC 1GB hard drive
Longer bars are faster.
An appropriately configured Quadra 950 has reached 120MB/min with FinderExpress

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- *Chameleon:* The ultimate desktop pattern enhancement utility
- *Calendar:* Versatile desktop calendar with notes and graphics
- *VectorPlasma:* Screen saver that uses minimal processor power
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The 7th Heaven Utilities are a collection of seven separate applications and installers that allow you to customize System 7 the way you like it. Use 7th Heaven instead of memory and disk hungry alternatives to make your Macintosh as fast and colorful as it can be.

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System 7 Enhancements That Make Sense

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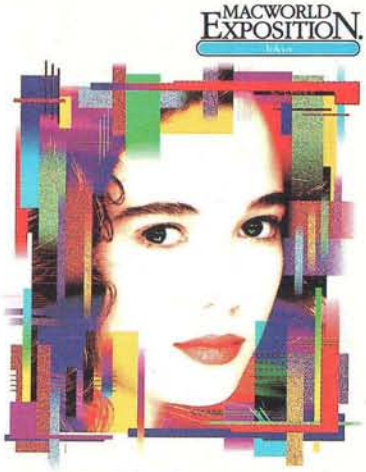

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- **Date** February 10th (Wed.) - 13th (Sat.), 1993
- **Place** Nippon Convention Center at Makuhari Messe, Tokyo
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Number of Exhibitors 215 **Booth Spaces** 956 **Expected Attendees** 90,000

General Sessions - U.S.Speakers				
2／10 (Wed.)	13:00	Keynote : Macintosh, Multimedia, PDA & Beyond		John Sculley, Chairman & CEO, Apple Computer Inc.
	15:00	Keynote : Future Technologies		David Nagel, Senior Vice President, Apple ATG
	16:30	Special Session		Jerry Borrell, President, SUMERIA
		QuickTime International Film Festival Tokyo		Y. Hamano, National Institute of Multimedia Education
2／11 (Thu.)	10:30	Consumer PDAs	PDAs and Consumer Market	Gaston Bastiaens, Vice President & General Mgr., Apple P.I.E.
	13:00	DTP, Graphics and Design	Future of Digital Photography	Rick Smolan, Photographer/President, Against All Odds
	14:30	System Software and Future OS	System Advances - Future Directions	Roger Heinen, Vice President, Software, Apple Computer Inc.
	16:00	Apple in Japan		Senior Vice President & General Mgr., Macintosh Architecture Div.
2／12 (Fri.)	10:30	Multimedia & QuickTime	The New Multimedia Standard	Nat Goldharber, President, Kaleida Labs, Inc.
	13:00	Multimedia & QuickTime	QuickTime Movie Makers	to be announced
	14:30	Future Operating System	Future OS, RISC and Power PC	Fred Forsyth, Senior V.P., Macintosh Systems Div., Apple Computer Inc.
	16:00	Networking & Business	New Style Communications	to be announced
2／13 (Sat.)	10:30	Multimedia & QuickTime	Multimedia Entertainment	Christopher Yavelow
	13:00	Multimedia & QuickTime	New CD-ROM Titles	to be announced
	14:30	DTP, Graphics and Design	Super Users Tips	Guy Kawasaki, Bob Lavitus, Steven Levy

General Sessions - Japanese Speakers				
2／11 (Thu.)	10:30	Collaboration and Networks	Collaboration and Group Networking	Tsuyoshi Sasada, Professor, Osaka University
	13:00	Business Work Integration	Macintosh for Office Efficiency	Mitsuhiro Miyazaki, AXIS
	14:30	Design	Design Advances (tentative)	to be announced
	16:00	TV & Press	Macintosh in Mass Media	Fuji TV, The Sankei Simbun, Nippon Hoso (tentative)
2／12 (Fri.)	10:30	PowerBook	What is Mobile Computing ?	Kazutoshi Otani, Macintosh Evangelist
	13:00	Multimedia & Business	Staff Training Program/Sales and Multimedia	Sumino Ueda, ANA Business Create / Tetsuya Kitayama, Uchida Yoko
	14:30	Graphics	3D Illustration/Macintosh and Animation	Naoyuki Kato, Illustrator / Hikaru Yuzuki, Cartoonist
	16:00	DTP	DTP Advances during 1992	to be announced
2／13 (Sat.)	10:30	Networked Databases	Organizing Business Information	to be announced
	13:00	Business & Customization	Customizing Applications for Your Office	Kiichi Ikenoue, Chiyoda Corporation Ryosuke Mizouchi, Kirin Brewery
	14:30	Education	Macintosh for Education	to be announced

☆ Sessions may be changed without advance notice.

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Zen and the Art of Motorcycle Maintenance & Lila
These two novels by Robert Pirsig in expanded book for the PowerBook format combine quirky characters with contemporary philosophy. Format allows readers to take notes and mark pages on the computer screen. 2MB min. memory. $19.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

CD ROMS

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Images with Impact CD-ROM
Library of modular clip art has over 1100 images in EPS and PICT formats. Contains all images from five 3G Graphics clip art collections: Accents & Borders 1 and 2, People 1, Business 1, and Graphics & Symbols, along with an additional 450 color images. 2MB min. memory. $499.95. 3G Graphics, 206/774-3518, 800/456-0234; fax 206/771-8975.

The Journeyman Project
Interactive computer game in which player jumps back in time to prevent someone—or something—from sabotoging history. Player clicks on arrows to navigate through scenes, and clicks on objects to interact with them. Also has message screens and an inventory window. Has three-dimensional graphics and full sound track. 5MB min. memory. $99.95. Presto Studios, 619/689-4895; fax 619/689-4895.

The Journeyman Project

A Poke in the Ear with a Sharp Stick (Volume II)
Alternative sound library has over 1800 samples in either 16-bit linear mono or stereo AIFF (audio interchange file format) files sampled at 44.1kHz. Consists of hard-edged industrial samples and ambient textures. Contains 150 rhythmic loops, 170 ambient textures, more than 500 percussion sounds, and more than 800 melodic sounds. 2MB min. memory. $199. OSC, 415/252-0460; fax 415/252-0560.

URW TypeWorks Collection
Contains 3000 PostScript Type 1 fonts and Kernus, a kerning utility. The fonts are style variations—regular, outline,

inline, relief, drop shadow, and rounded—of 500 popular faces. Fonts are from URW's type library, which includes contemporary designs and classics licensed from sources such as ITC. Each font includes about 1000 kerning pairs. All the fonts are unlocked and available for instant access. 512K min. memory. $895; 1000-page specimen book $49.95. URW, 603/882-7445, 800/229-8791; fax 603/882-7210.

Who Built America
A survey of American history presenting a populist view of past and present by the American Social History Project. Includes QuickTime movies, audio bites, newspaper accounts, and reproductions of historical documents. 2MB min. memory. $24.95 per volume. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

Who Killed Sam Rupert?
Interactive murder-mystery game created with color video, sound, and animation. To solve the crime, the player has to check the validity of various types of information, but each activity chosen to help solve the crime carries a time penalty. Game includes a view of the murder scene, where the player can examine objects in detail; a battery of forensic tests; an alibi section, for cross-referencing evidence and alibis; a video press conference, in which the player addresses the media; and a case notebook, where the player can keep key facts, make observations, and keep other material. 4MB min. memory. $39.99. Creative Multimedia Corp., 503/452-5921, 800/776-9277; fax 503/452-5930.

Who Killed Sam Rupert?

You Can't Get There from Here
Clips from films made between 1946 and 1960 discuss how to act on a date, how to behave at dinner, the benefits of electricity, and the soothing effects of prescription drugs. QuickTime movies are accompanied by written commentary on the period and the purpose behind the film. 4MB min. memory. $29.95. The Voyager Company, 310/451-1383, 800/446-2001; fax 310/394-2156.

ACCESSORIES

Padware
Three products—the Mouse Cover, Mouse Pad, and Wrist Rest—have ergonomic benefits, according to company. Mouse Cover slips over mouse to add curve to surface. Mouse Pad has 20cm diameter and is circular. Wrist Rest has a rounded, sloping edge and an edge that tucks under keyboard. All three products are available in green, blue, black, and red. Mouse Cover $8.95; Mouse Pad $12.95; Wrist Rest $14.95. Padware Ergonomic Technology, 617/848-7310; fax 617/849-3280.

Padware

BOOKS AND VIDEOS

CWUG's Public Domain Catalog
Lists hundreds of ClarisWorks templates and Mac fonts, graphics, utilities, DAs, and other ClarisWorks-compatible public domain and shareware products. Includes $2 rebate valid for future purchases from CWUG. Written by CWUG. 80 pages; $10. ClarisWorks Users Group (CWUG), 313/454-1969; fax 313/454-1965.

Microsoft Excel 4 Companion
Guide to Microsoft Excel 4.0. Teaches novice users how to create, edit, and format an Excel worksheet; incorporate formulas; link spreadsheets; use built-in functions; and print presentation-quality reports. Intermediate to advanced users learn how to create, customize, and enhance charts, including how to incorporate graphic objects in worksheets. Appendix describes the nine built-in tool bars, showing each tool bar and including a chart of tools and their locations. By the Cobb Group: Douglas Cobb and Judy Mynhier with Mark Dodge, Craig Stinson, and Chris Kinata. 864 pages; $29.95. Microsoft Press, 206/882-8080, 800/677-7377; fax 615/793-3915.

The Mac Shareware Emporium
Reviews over 450 shareware and freeware programs—games, educational products, business applications, system extensions, and control panel devices. Each entry has product name, author-contact information, cost, description, and sample screen illustration. Book also has information on how to evaluate products and sources for quality, support, and virus protection, plus a sampler disk with over 30 shareware programs. Written by Bernard J. David and Maria L. Langer. 4MB recommended. 388 pages; $34.95. Brady, 317/573-2500, 800/428-5331; fax 317/573-2583. **m**

To have your product considered for inclusion in *New Products,* send an announcement with product name, description, minimum memory, peripherals required, pricing, company name, and phone number to New Products Editor, *Macworld,* 501 Second St., San Francisco, CA 94107. *Macworld* reserves the right to edit all product announcements.

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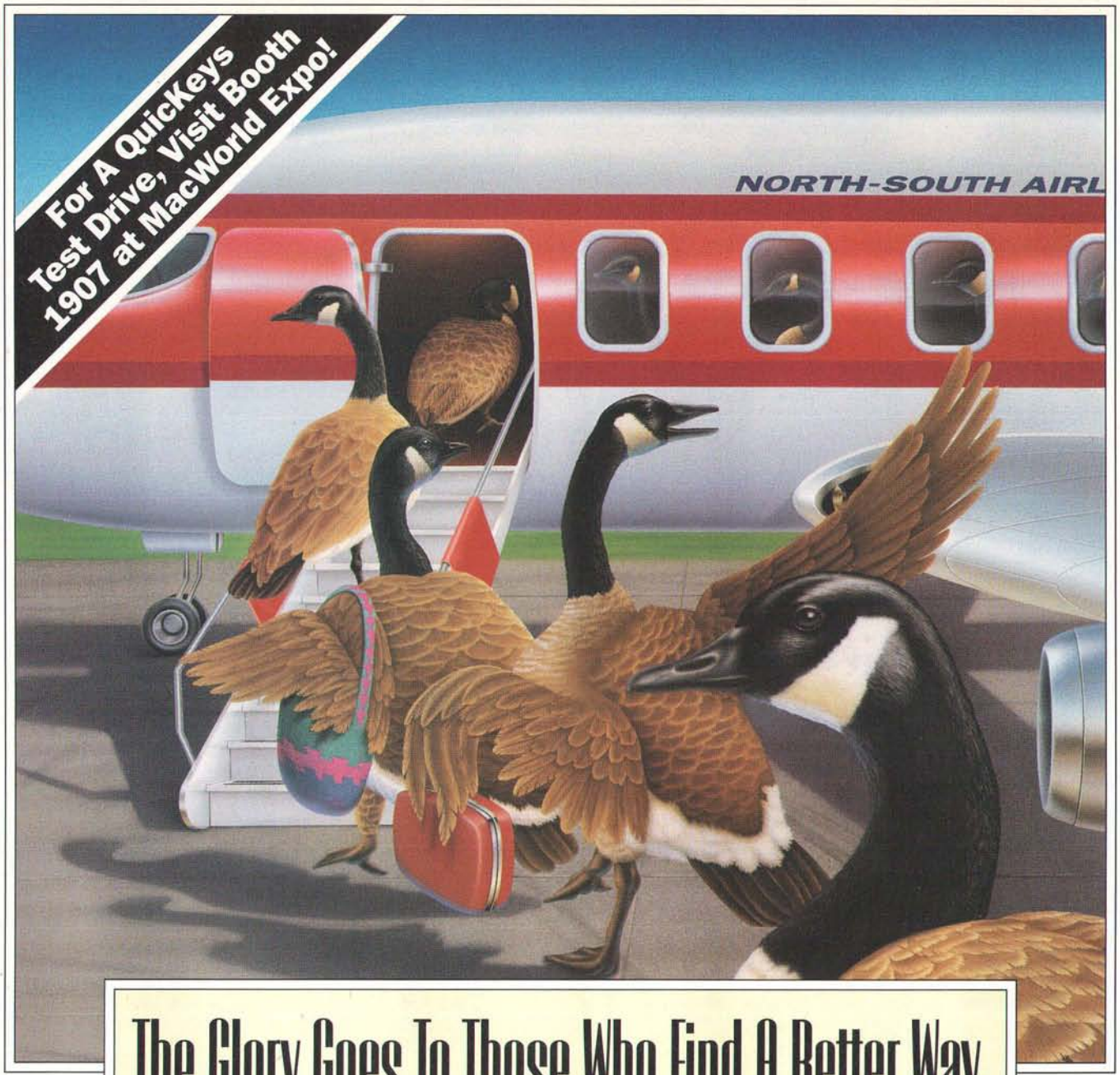
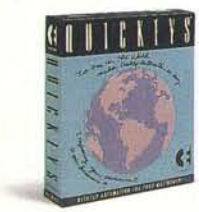


The Glory Goes To Those Who Find A Better Way.



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Circle 222 on reader service card

Questions and Tips from Macworld Readers

BY LON POOLE

SYSTEM 7.1, RELEASED LAST October, makes it easier than ever to install multiple languages on a Mac (as described in *Quick Tips*, September 1992). It's the first Mac system software that requires no major reengineering to work with languages that read from right to left, languages whose characters change according to their context, and languages with large alphabets that require two bytes of memory per character (such as Japanese, Chinese, Hebrew, and Arabic). Systems 7.0, 7.0.1, and 6.0.7 work with European languages that use the Roman or Cyrillic script systems, and these system versions have been translated into some of the more complex languages. Two system extensions give System 7.1 its international capabilities. WorldScript I handles bidirectional and contextual script systems, and WorldScript II handles script systems with large alphabets.

Once you've installed WorldScript, how easy is it to use multiple languages? Steven P. Hassman of Garmisch, Germany, wonders whether one can type right-to-left Hebrew in today's Macintosh word processors, and whether a language script's rules for text sorting make it possible to sort foreign language word lists in the correct order for that language, which may differ from the English *A* to Z.

I tried prerelease versions of System 7.1 and several language scripts—Hebrew, Greek, Cyrillic, and Arabic—with MacWrite II 1.1v2, Microsoft Word 5.0, WordPerfect 2.1, and the word processor in ClarisWorks. All were able to change languages on the fly. For example, I could type some text in English, choose Hebrew from the Keyboard menu (which appears between the Help menu and Application menu when you install multiple languages), choose a Hebrew font from the Font menu, and start typing in Hebrew. The English typing progressed from left to right, and the Hebrew typing went the opposite direction, as it should.

Sorting was another story. Both WordPerfect 2.1 and Word 5.0 have Sort commands, but both alphabetized correctly only for English. Conclusion: The applications you have will let you get some benefit from installing multiple languages, but developers will have to revise applications (and you'll have to upgrade to those revisions) to take full advantage of System 7's WorldScript.

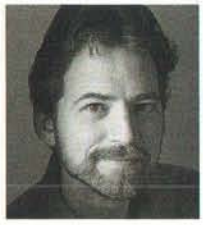
Changing the Application Font

Q. I personally dislike the Geneva font, which my Classic automatically selects. How can I reconfigure my Mac so that, for example, Times is automatically selected each time I open a MacWrite document?

David deClue
Saint Louis, Missouri

A. Many application programs and desk accessories use the Mac's standard application font by default. The Mac stores the identity of this font in its parameter RAM—a small amount of battery-powered memory that stores sundry system settings. You can override the application font setting in parameter RAM by installing the free utility software DeFont (available from user groups including BMUG, 510/549-2684) or It's Your Default (from the BCS Mac user group, 617/625-7080). DeFont and It's Your Default are control panels (known as cdevs in System 6) that let you choose any installed font as the application font.

Some programs, including MacWrite II, Microsoft Word, and WriteNow 3.0, do not use the application font. DeFont and It's Your Default do not affect them. To change MacWrite II's standard font, create a new document, choose the font you want used, and choose Save As from the File menu. In the Save As dialog box, choose MacWrite II Stationery from the pop-up menu, name the document MacWrite II Options, and save it in the Claris folder inside the System Folder. (Before saving you can make other changes to the document's format and content; MacWrite II will apply them to all new documents you subsequently create.) You follow a similar procedure in WriteNow 3.0, using WriteNow's Save As Default Document command instead of its Save As command. In Word 5, the Preferences command has a Default Font option.



Charging modem calls, measuring cap height, tapping Finder power, and more

Charging a Call

Q. Can the White Knight telecommunications program access an alternate long-distance carrier and charge the call to a phone credit card? GEnie, CompuServe, and America Online do not have local numbers for my area. I have to dial 1-800/877-8000 to access Sprint; wait for a tone; dial 0, the area code, and the GEnie access number; wait for another tone; and finally dial a 14-digit authorization code. Can the program do this?

Jeffrey A. Ohlrich
Abingdon, Virginia

A. White Knight (from The FreeSoft Company, 412/846-2700) and most other communications programs let you enter all the numbers you need to dial as one long string in the space provided for the telephone number, placing one or two commas wherever you need to provide a pause. For example, the 40 characters

18008778000,,0703555 1212,,12345678901234

would cause the modem to dial 1-800/877-8000, pause four seconds (two seconds for each comma), dial 0-703/555-1212, pause four more seconds, and dial 123/456-7890-1234. The problem is that most modems cannot handle a dialing string longer than 38 characters, not counting blank spaces. If you enter a dialing string longer than a modem's limit, the modem reports an error. Some fax modem software gets around this length limit by providing separate spaces for you to enter the

continues

KEYS TO THE FINDER

Objective	Action
SELECTING ITEMS	
Select an item	Type the item's full or partial name
Select the next or previous item alphabetically	Press tab or shift-tab
Select the next item up, down, left, or right	Press ↑, ↓, ←, or →
Select the desktop item nearest upper right corner	Press ⌘-shift-↑
Select multiple items	Press shift while clicking each item or while dragging to enclose them
OPENING AND CLOSING	
Open the selected item	Press ⌘-O or press ⌘-↓
Open the selected item and close the active window	Press ⌘-option-O or press ⌘-option-↓
Open the folder or disk that contains the selected item	Press ⌘ while clicking the window's title or press ↑
Open the folder or disk that contains the selected item and close the active window	Press ⌘-option while clicking the window's title or press ⌘-option-↑
Close a window while opening an item in it	Press option while opening the item
Close all windows	Press option while clicking the active window's close box
MANIPULATING OUTLINES OF FOLDERS	
Expand or collapse the selected folder	Press ⌘-→or ⌘-←
Expand or collapse the selected folder and its nested folders	Press option while clicking the triangle next to the folder icon or press ⌘-option-→ or ⌘-option-←
Expand or collapse all folders in the active window	Press ⌘-A and then press ⌘-option-→or ⌘-option-←
MORE POWER METHOD	
Begin editing the selected icon's name	Press return or enter, or click the name and immediately move the pointer slightly
Zoom a window to fill the screen	Press option while clicking the window's zoom box
Move a window without making it active	Press ⌘ while dragging the inactive window
Copy an item to another folder on the same disk	Press option while dragging the item to the folder or to the folder's open window
Copy an item to the desktop	Press option while dragging the item to the desktop
Dispose of items in the Trash without warnings, and dispose of locked items	Press option while choosing Empty Trash
Align (or don't align) icons to invisible grid as you temporarily move them (temporarily reverses the Views control panel's Always Snap To Grid setting)	Press ⌘ while dragging the icons
See the path from the current window to the disk it's on	Press ⌘ while clicking the window's title
Erase a disk	Press ⌘-option-tab as you insert the disk
Skip installation of all System extensions during one start-up	Hold down the shift key during start-up
Rebuild the desktop	Hold down ⌘-option during start-up or when inserting a disk
Force the active program to quit (you should restart your Mac as soon as possible after doing this)	Press ⌘-option-esc

Power methods and keyboard equivalents for the Finder in System 7. Keyboard equivalents for menu commands aren't listed because you can review them on screen by pulling down the menus.

various parts of the dialing string.

Jeff Dripps of FreeSoft suggests two ways to work around this length limit with White Knight or any communications program that lets you type modem commands directly. With one method you split the dialing string into two or more segments, beginning each with a modem-dialing command (ATDT for touch-tone or ATDP for pulse) and ending each segment except the last one with a semicolon. The semicolon causes the modem to remain in command mode instead of trying to establish communication with a modem at the other end of the phone line. You could type the dialing string cited in the previous paragraph in three segments, pressing return at the end of each line, as follows (hyphens and spaces are optional):

ATDT 1-800-877-8000;
ATDT 0-703-555-1212;
ATDT 123-456-7890-1234

For the second method, instead of typing multiple dialing commands to have the modem dial the numbers, you can dial them yourself on a telephone connected to the same phone line as the modem. Start by typing the following modem command in the communications program, but do not press return at the end of the line:

ATX1D

Then use the telephone to dial the complete sequence of numbers (access phone number, number of the remote modem, and authorization code). When you complete the call and hear the remote modem's answering tone, press return on the keyboard, causing the modem to execute the command you typed before. This command tells the modem to pick up the phone without dialing any numbers. Listen on the telephone for the sound of static, which indicates your modem and the remote modem are communicating, and then hang up the telephone.

Unfortunately, neither of these methods works with custom communications programs that only provide space for entering a phone number, such as America Online versions 1.0 and 2.0 and AppleTalk Remote Access 1.0. You can use either method with AppleLink 6.1 by choosing Set Up Connection from the Network menu, and then in the dialog box that appears choosing Manual Connect from the Connection File pop-up menu. Upon connecting, with this setting in effect, AppleLink brings up a dialog box in which you can type modem commands. You click the Continue button in that dialog box when you hear the AppleLink modem's answering tone.

Stop First Page

Q. A year ago or so I read in *Quick Tips* how to get my Personal LaserWriter NT to stop printing that annoying first page every time it's turned on. I've forgotten how to do it and can't find it in my back issues.

Lois Mraz
Los Angeles, California

A. Versions 7.0 and later of Apple's LaserWriter Utility can turn off (and on) the test page (also called the start-up page) on a LaserWriter with PostScript. You can get the latest version as part of System 7.1, which Apple is selling through retail channels.

ATM and Bitmap Fonts

Q. Since I use Adobe Type Manager (ATM), can I remove all but one size and style of each of my bitmap (fixed-size) fonts that correspond to the PostScript fonts in my System Folder? For example, why should I install sizes 10 through 18 in four styles of Palatino when ATM creates for my screen whatever size and style I request if I have at least one bitmap Palatino size and style installed?

Peter Lind
Montreal, Quebec, Canada

A. Although ATM works fine if you have only one bitmap size and style installed for each PostScript font in the System Folder (or in the Fonts folder in System 7.1, or the Extensions folder in

continues

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Circle 35 on reader service card

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System 7.0 or 7.0.1), there are a couple of reasons for installing multiple sizes and styles of bitmap fonts with ATM. One reason is that bitmap text displays faster than text displayed by ATM. The difference is more noticeable on slow Macs; you can make ATM faster by increasing the Font Cache setting in the ATM control panel. Adobe recommends 50K of cache for each PostScript font you use frequently, and there may be separate PostScript fonts for different styles of a single font that appears in the Fonts menu. If you use plain, bold, and italic Times, for example, then ATM needs the three PostScript fonts TimesRom, TimesBol, and TimesIta, and you should set your ATM Font Cache to 150K for best speed.

A more obscure reason for installing multiple sizes and styles of bitmap fonts with ATM is that documents created with bitmap fonts in screen-oriented programs such as HyperCard and Aldus Persuasion, where text must fit in fixed-width boxes, may not look right if later displayed with fonts created by ATM. For some sizes and styles of some fonts, ATM may create text whose width doesn't exactly match the corresponding bitmap text. Your choice: leave the bitmap fonts installed or resize text boxes in documents where ATM text doesn't fit.

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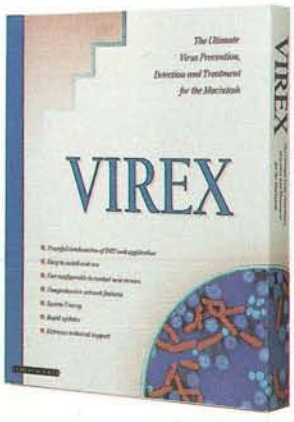

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Finder Power

TIP Most System 7 users have discovered how to use the Views control panel to force icons to align to an invisible grid. If you want to drag an icon or group of icons and place them off the grid, hold down the ⌘ key while dragging.

Tyler Gunn
Winnipeg, Manitoba, Canada

You can tap a great deal of hidden power by pressing the ⌘ and option keys, and much of what you can do with the mouse you can also do with the keyboard alone (see "Keys to the Finder").—L.P.

Measuring Cap Height

TIP Say you want to set a headline and need the cap height (height of a capital letter) to measure 54 points. Because capital letters are smaller than the nominal point size, you can't simply set the type size to 54 points. I've found an easy method to size type to the cap height; it works in QuarkXPress and could probably be adapted to other desktop publishing programs.

1. Enter the headline text on one line and press return at the end of the line.
2. Copy the line of text and paste it on the next line. You now have two copies of the headline text.
3. Select both lines and set the leading of both to the cap height you want.
4. Select the second line and increase the point size gradually, until the cap height of the second line touches the baseline of the type on the line above it (see "Cap Size").

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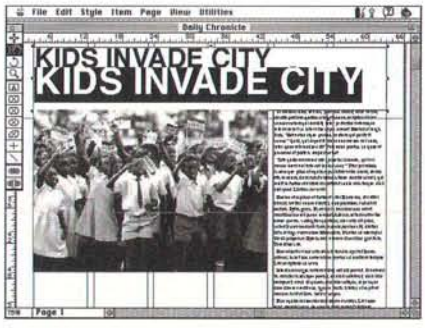

Cap Size In QuarkXPress, to set a line of text so the capital letters are a specific size, set the leading to the size you want, duplicate the text on the next line, and increase the size of the second line until it touches the first.

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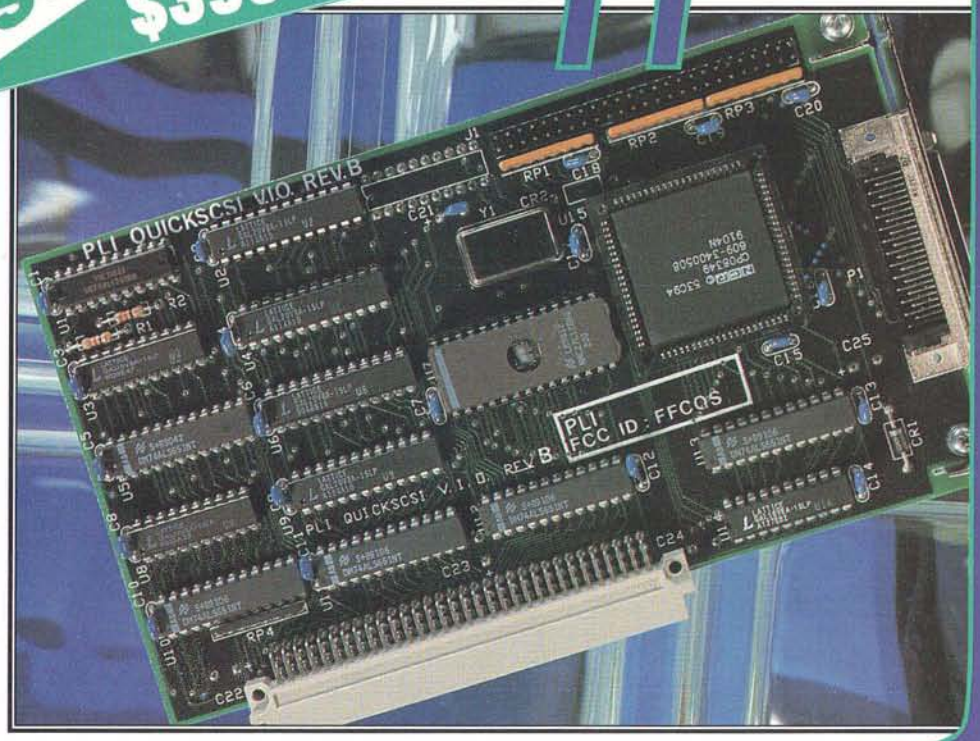

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This method is much quicker and more accurate than other schemes I've used, such as measuring the height of the type with the ruler or the line tool, or endlessly printing and measuring the results.

Sam Jennings
San Francisco, California

Delete Forward

TIP After using an MS-DOS computer for a couple of years to do word processing at work, I became accustomed to deleting forward from the insertion point by pressing the decimal-point key on the keypad with number lock (Num Lock) off. When the company bought a couple of Macs, I found the handy delete-forward key was poorly placed on the extended keyboard, and was completely missing from the Classic's standard keyboard. Instead of training my old fingers to do new tricks in Microsoft Word, I got around the keyboard difference with Word's Commands command (see "Go Ahead and Delete").

Jeffrey F. Grandon
Provo, Utah

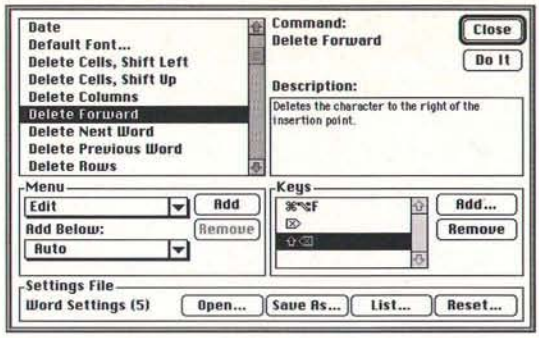
Combining System Sounds

TIP The Sound control panel lets you record sounds but not edit them. You can edit and combine sounds from the Sound control panel using HyperCard's audio palette. For example, repeating the Droplet sound that comes with System 7 makes the sound effect of a flying saucer.

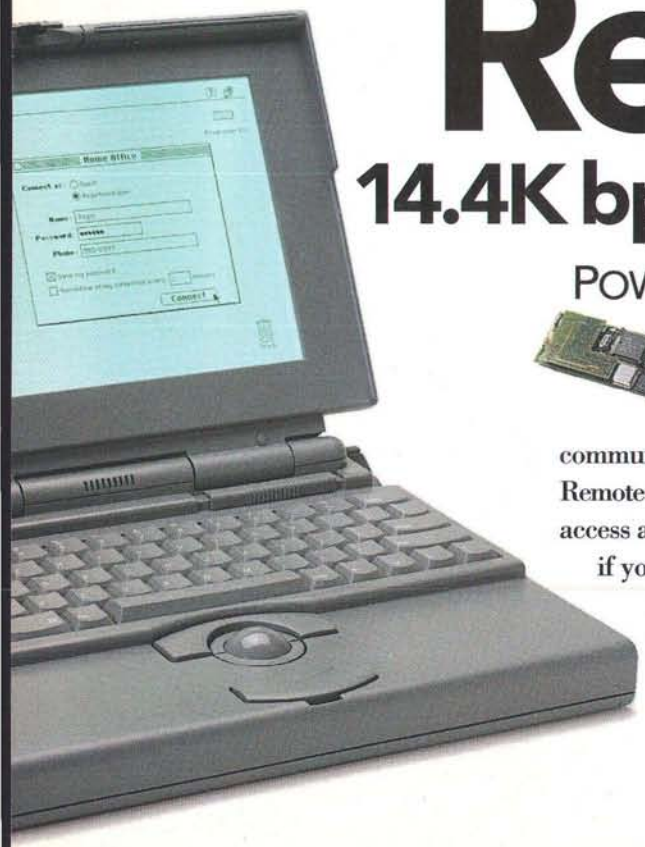
First select the sound you wish to edit from the control panel and use the Copy command to place a copy of the sound on the Clipboard. Next open HyperCard, choose Audio from the Edit menu to bring up the audio palette, and click the Edit button in the audio palette to enable sound editing. Then choose Paste Sound from the Edit menu to paste the sound from the Clipboard into the audio palette; repeat to paste multiple copies of the sound end-to-end. Now choose Select All and Copy from the Edit menu to put a copy of the compound sound on the Clipboard. Switch to the Sound control panel, choose Paste from the Edit menu, and name the compound sound when requested. The new sound is now part of your Sound control panel. If you quit HyperCard or close the audio palette without quitting, you do not need to save the new sound as HyperCard suggests.

Try this variation: In HyperCard, select only a portion of the sound by dragging across the audio palette's close-up view of the wave form. Then copy and repeatedly paste this sound fragment. Another variation: One at a time, copy additional sounds from the Sound control panel and paste them into HyperCard's audio palette.

Paul Hibbard
Houston, Texas



Go Ahead and Delete If your keyboard doesn't have a delete-forward key, you can designate one for use in Microsoft Word 4 or 5. In the dialog box for Word's Commands command (under Edit in Word 4; under Tools in Word 5), select Delete Forward in the scrolling list, click the Add button in the Keys section, and press the key or key combination you want to make effective (shift-delete here). Then click the Close button.



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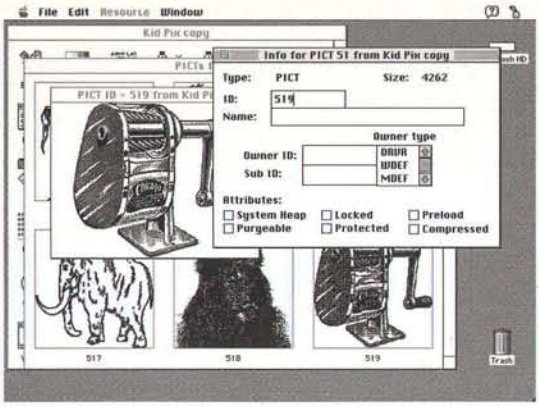

Surprise Eraser Add to your repertoire of Kid Pix surprise erasers by pasting any picture into a new PICT resource that you create with ResEdit and number in sequence with the other PICT resources containing pictures of animals.

Personal Surprise

TIP While you're using the eraser tool in Brøderbund Software's Kid Pix, the Surprise icon (the question mark) lets you erase the picture to reveal not a white background but an animal or funny face. Kid Pix chooses the background surprise randomly. You can add your child's favorite picture (or maybe your own favorite) to the collection of surprises with a resource-editing program such as Apple's ResEdit. Use any picture in the common PICT format; if you can see the picture when you paste a copy into the Scrapbook, it will work.

Begin by making a duplicate copy of the Kid Pix program. Next open your picture with a graphics program, select the picture, and copy it to the Clipboard. Then open ResEdit and use its Open command to open the copy of Kid Pix. A window appears showing an icon for each type of resource in Kid Pix. Find the PICT icon and double-click it to see a window full of numbered miniatures of Kid Pix's PICT resources. Scroll the window until you see the last animal, and note its number (a lion with number 518 in Kid Pix 1.2). Then choose Create New Resource from ResEdit's Resource menu, which opens an empty window for a new PICT resource. Paste your picture into this window. Next choose Get Resource Info from ResEdit's Resource menu, and in the resource info window that appears change the ID to the number you previously noted plus 1 (number 519 in version 1.2), as shown in "Surprise Eraser." Quit ResEdit, answering yes when it asks whether you want to save your changes. Now when you use the surprise eraser tool in your special copy of Kid Pix, it randomly selects the picture you added.

Beckie Pack
Napa, California

Kid Pix also uses that collection of PICT images to randomly display a picture when you start the program. You can get ResEdit from user groups, online information services, and APDA (Apple Programmer's and Developer's Association, 800/282-2732 U.S., 800/637-0029 Canada, or 408/562-3910 anywhere).—L.P. **m**

We pay from $25 to $100 for tips published here. Send questions or tips on how to use Mac computers, peripherals, or software (by mail or electronically) to *Quick Tips,* Lon Poole, at the addresses listed in *How to Contact Macworld* at the front of the magazine (include your address and phone number). All published submissions become the property of *Macworld.* Due to the high volume of mail received, we're unable to provide personal responses.

Contributing editor LON POOLE answers readers' questions and selects their tips for this monthly column. His two most recent books are *Amazing Mac Facts* (Microsoft Press, 1991), a collection of the best published tips; and *Macworld Guide to System 7* (IDG Books Worldwide, 1991).

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Memory-Maximizing Tips

BY JIM HEID

ARE YOU GETTING THE MOST out of your short-term memory? I refer not to your ability to recall what you ate yesterday, but to your Mac's *random-access memory*—its *RAM*—those chips that provide temporary storage for the Mac's system software as well as for the programs you use and the documents you're working on.

If you've been seeing "not enough memory" error messages lately—or if you've just bought a memory upgrade and you'd like to put that extra space to work—read on. Few of the Mac's components offer more opportunities for fine-tuning than memory. When you understand how the Mac uses memory, you can make a variety of adjustments to improve overall performance, increase the number of programs you can run simultaneously, or speed up a particular program. And none of these adjustments require you to open the Mac. You can fine-tune your memory from the comfort of your mouse.

You Must Remember This

BEFORE LOOKING AT MEMORY-MAXIMIZING specifics, let's step back for the big picture. Let's also make sure we're looking at the same scene, because many Macintosh newcomers confuse the Mac's RAM with its hard drive storage, probably because both are described using the same units of measurement: the kilobyte (K), or a thousand bytes (technically, 1024 bytes); and the megabyte (MB), or 1 million bytes (actually, 1,048,576 bytes).

RAM is temporary storage space formed by a collection of chips soldered onto the Mac's logic board or installed in small, plug-in boards. When the Mac is turned off (whether by you or by a power failure), the contents of RAM disappear faster than punch on New Year's Eve. Most Macs come with between 1MB and 4MB of RAM, which you can expand—more about that later.

A hard drive, by contrast, provides permanent storage (or at least it's designed to—drives can fail, so a regular backup routine is essential). Most Macs include hard drives that can store up to 40MB or 80MB of data; much higher capacities are available.

In the Mac, as in other computers, RAM plays a few roles. RAM holds a large portion of the Mac's fundamental system software (called System 7, although many people are still using older, less-capable system software versions, such as System 6). When the Mac starts up and displays its "Welcome to Macintosh" message, it's loading this RAM-based system software from the hard drive.

During start-up, the Mac also loads *system extensions*, enhancements to the system software. You can tell when system extensions are being loaded—their icons appear along the bottom of the screen. Two popular system extensions include Berkeley Systems' After Dark screen saver (you've probably seen toasters flying across *someone's* screen) and CE Software's QuicKeys, which lets you create keyboard shortcuts.

The final step in the start-up process involves loading the Finder, the program that gives you the desktop and Trash icons. In System 7, the Finder itself uses roughly 500K of RAM—almost four times the total amount of RAM built into the original Macintosh.

The point is that some of the Mac's RAM is filled right off the bat. You can find out how much RAM your system software and extensions use by choosing the About This Macintosh command from the Finder's Apple menu (in System 6, the command is About the Finder). A window appears describing how your Mac's RAM is being used (see "Window into Memory"). This window can be a memory maximizer's best friend.

Make Room for Programs

WHEN YOU START AN APPLICATION program such as Microsoft Word or ClarisWorks, the Mac sets aside some RAM for the program and then copies the program from the hard drive into that memory. Actually, with most programs, only part of the program goes into RAM—the part that implements the program's most common features. When you choose a particular command for the first time since starting the program, you might notice a short delay as the Mac retrieves the required software routines from the hard drive. (If your hard drive has a front-panel light, it blinks.) When this happens, the Mac is loading one of the program's *code segments* from disk.

Most large programs are divided into numerous code segments. The Mac can load a given segment into memory when it's needed, and it can purge segments from memory to free up space. This scheme allows developers to create programs with smaller minimum memory requirements. On the downside, frequently accessing the hard drive slows performance, especially on a slower Mac such as a Classic. Later, I'll show how to minimize segment loading.

Part of the memory allocated to a program is reserved for the documents you have open as you work. Some programs store an open document entirely in RAM; common examples include integrated packages such as ClarisWorks and Microsoft Works and draw programs such as Adobe Illustrator, Aldus FreeHand, and Claris's MacDraw. With these programs, the maximum size of a document is limited by the amount of its program's free RAM. An example: When you start Microsoft Works 3.0, the Mac gives Works 1536K of RAM. Works' program code takes up about half that amount; roughly 750K remains free for the documents you'll work with.

How the Mac uses memory—and how to get the most out of yours

Other programs don't store an open document entirely in RAM, but instead swap portions of the document to and from the hard drive, keeping in RAM only the portion you're working with at the moment. Most standalone word processors—Microsoft Word, WordPerfect, T/Maker's WriteNow—work this way, as do Aldus PageMaker and QuarkXPress and most database managers, including FileMaker Pro. This approach lets you create much larger documents, but moving around within a document can take longer (it's that relatively slow hard drive again).

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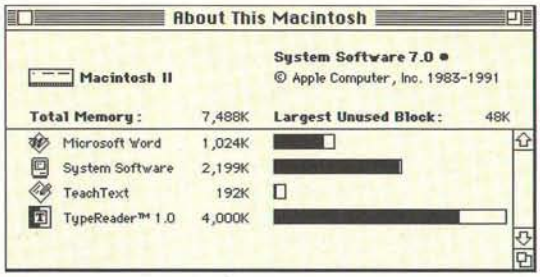


Window into Memory System 7's About This Macintosh window displays a bar graph for the system software and for each open application. Each bar shows how much memory is allocated to that program; the dark-shaded portion of each bar shows how much of that RAM the program is actually using.

Whether a program stashes open documents entirely in RAM or swaps them between RAM and the hard drive may seem like a trivial technical point, but it has important ramifications you may need to consider when fine-tuning your short-term memory.

Maximizing Techniques

YOU CAN MAKE FOUR BASIC MEMORY-related adjustments. Notice that each has a potential drawback—weighing each technique's pros and cons is an important part of memory maximizing.

• You can use the Finder's Get Info command to control how much memory a program receives when you open it. If you want to run two programs at the same time but you're a little lean on RAM, you can reduce each program's memory requirements to shoehorn both into memory. Each program is likely to run more slowly, since the Mac has to load and discard segments more frequently. And integrated packages and draw programs are limited to smaller documents. Conversely, if you want a given program to run faster or you want to create larger documents with an integrated package or draw program, you can increase its memory allocation. When a program has more RAM to work in, it doesn't have to go out to the hard drive to load code segments as frequently. But less free RAM is available for other programs. For advice on allocating memory to some popular programs, see "RAM Strategies."

• You can use the Memory control panel to increase or decrease the size of the *RAM cache*. This is a part of the RAM allocated to the system software that holds information recently read from the hard drive. If this information is needed again, the Mac retrieves it from the cache instead of from the hard drive. A larger RAM cache can improve performance if you frequently switch between two programs or perform repetitive tasks. If you work sporadically—if you're never sure which program, command, or document you might use next—a large RAM cache is less likely to boost performance. In addition, it leaves less free RAM for running other programs. Experiment with various cache sizes (you must restart the Macintosh after each adjustment to put your change into effect). If performance doesn't improve, reset the cache to its original size—or even consider reducing its size to free up RAM for other uses.

• You can use the Memory control panel to activate System 7's *virtual memory* feature. Virtual memory blurs the lines between hard drive and RAM storage by tricking the Mac into thinking that part of the hard drive is actually RAM (see "Virtually Memory"). This lets you run more programs than would otherwise fit into RAM, but switching between programs takes longer than if you had the equivalent amount of real RAM. (Virtual memory doesn't work on the Classic, SE, Plus, LC, or PowerBook 100. To use it on the original Mac II, you need a Motorola 68851 *PMMU* [Paged Memory Management Unit] chip, which costs roughly $200.)

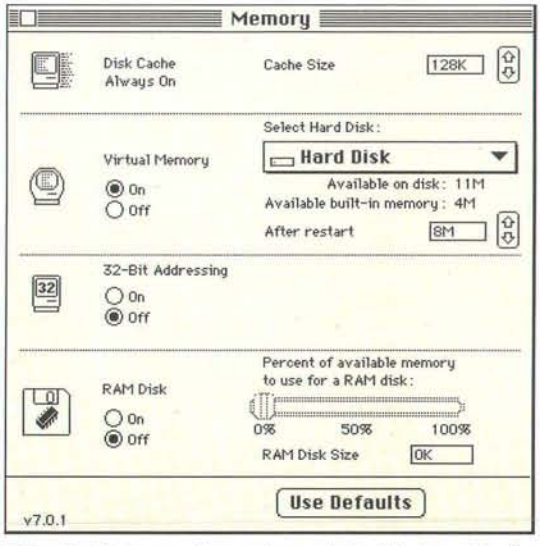
In theory, you can also use virtual memory to run a program that's too large to fit into RAM. For example, if you want to run a program that requires 4MB of free RAM on a Mac that has only 3MB free, you could use virtual memory to make up the 1MB difference. In practice, however, this usually delivers painfully slow performance. If you have enough real RAM to accommodate the largest program in your software library, then when you start or switch to that program, it runs at normal speed; switching to or starting other programs is on the slowish side, though, since that's when VM has to swap between RAM and disk.

• You can create a *RAM disk* to speed up a program and extend PowerBook battery life. Like virtual memory, a RAM disk is a software sleight-of-hand. But instead of treating part of the hard drive as RAM, a RAM disk sets aside some memory to act as a hard drive. Because RAM is faster than a hard drive, anything stored on a RAM disk opens at top speed. Most new Macs let you create a RAM disk using the Memory control panel. If your Memory control panel doesn't contain a RAM disk option, use a utility program to create a RAM disk. My favorite is AppDisk, a $15 shareware program by Mark Adams, available through online services and user groups. Unlike most RAM disk utilities, AppDisk doesn't require you to restart the Mac to remove the RAM disk or change its size. You can also configure AppDisk so that it automatically copies certain files to the RAM disk each time the RAM disk is created.

One drawback to a RAM disk is that the RAM it uses isn't available for running programs. Another drawback is that you need to restore the contents of a RAM disk each time you start up the Mac, because—except on a PowerBook 100—a RAM disk's contents vanish when the power goes.

What should you stash in a RAM disk? Ideally, a copy of the System Folder as well as copies of the application programs you want to run at top speed. Unfortunately, you need a few megabytes of RAM disk space just to hold System 7's bloated System Folder—unless you pare it down to essentials. But don't worry; when you need the extra capabilities, you can always restart from the System Folder on the hard drive. (For tips on paring down the RAM disk's System Folder and using a RAM disk with a PowerBook, see *PowerBook Notes*, in this issue.)

If you're using a PowerBook and you have a RAM disk large enough to accommodate a System Folder and an application program, use the Startup Disk control panel to specify that your Mac start



Virtually Memory On most current Macintosh models, the Memory control panel lets you set aside some hard drive space as an extension of RAM. Here, the RAM in a 4MB PowerBook 170 is being supplemented with virtual memory to create the equivalent of an 8MB machine. The controls at the bottom of the window let you create a RAM disk; if your Mac's Memory control panel doesn't have a RAM Disk section, you need to use a utility such as AppDisk to create a RAM disk.

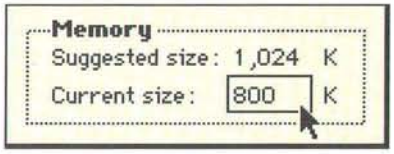
up from the RAM disk. Then restart. When the desktop reappears, use the PowerBook control panel to put the hard drive to sleep. You can now run from the RAM disk and greatly extend the time between battery charges. You need to wake up the hard drive in order to save documents on it, though—you can save documents on a RAM disk, but if a system crash or power outage corrupts the RAM disk, you lose your work.

If you don't have enough memory to create a RAM disk that will hold both the

continues

RAM Strategies

To change an application program's memory allocation, select its icon and choose Get Info from the Finder's File menu. Type the desired memory allocation in the Current Size text box (see "Allocating Memory"). You can also use AppSizer, a $19.95 shareware control panel from Peirce Software, to change memory sizes on the fly—that is, at the moment you start a program. This can be handy if you frequently alternate between various memory-allocation settings depending on the project at hand. AppSizer also allows you to temporarily change the memory allocation of a program located on a CD ROM drive—a feat beyond the Get Info command.



Allocating Memory You can change a program's memory allocation by typing the desired value in the lower-right corner of the Get Info window. Here, a program's memory allocation is being reduced from 1024K to 800K.

How much of a change should you make? Here are some guidelines for several popular programs.

Microsoft Word 5.0 Word's present memory allocation is 2048K (2MB), but the program will run in as little as 512K. (If you specify 512K, the Finder asks if you're sure you want to set the memory size to less than the suggested minimum. Click on OK.) Performance will be sluggish and the grammar checker and other plug-in modules may not work. If you're creating a stripped-down version of Word, remove unessential plug-in modules and file converters from the Word Commands folder (located within the Word folder). Word 5.1, recently released, offers a minimal installation option.

As for increasing Word's memory allocation, you might want to boost it beyond 2048K if you compile large indexes or tables of contents, perform search-and-replace with long documents, or import large scanned images. Increasing or decreasing Word's memory allocation does not affect maximum document length, although significantly decreasing its memory allocation may mean you're unable to search-and-replace or compile indexes with long documents.

ClarisWorks and Microsoft Works These integrated packages store open documents entirely in RAM, so their memory allocation directly affects the size and quantity of the documents you can create. Both programs benefit from a larger RAM allocation by allowing you to create larger documents or open more documents simultaneously. ClarisWorks normally receives 900K, but will run in 768K. Microsoft Works normally receives 1536K, but will accept 675K. (Note that you may not be able to open a large document that you created before you reduced the program's memory size. If this happens, restore the memory allocation to its larger size, open the document, and divide it into a number of smaller ones.)

Aldus PageMaker and QuarkXPress PageMaker 4.2 requires at least 1500K; QuarkXPress 3.1 requires at least 1700K. Reducing either program's memory allocation slows performance and could compromise reliability; also, you may not be able to use some Aldus Additions or Quark XTensions (both add features to their respective programs). You can free up some RAM by removing any import/export filters you don't use. Boosting either program's memory allocation improves performance by reducing segment loading. Both programs provide a *greeking* option that displays text as gray lines; use this feature to speed up overall scrolling and page display.

Claris MacDraw Pro This draw program normally receives 3000K. On a compact monochrome Mac such as a Classic, you can run the program in as little as 1000K. For creating color documents, however, you'll want to give the program at least 2000K—more if you have a large-screen monitor. See Appendix A in the MacDraw Pro manual for more memory tips.

Adobe Type Manager If you use this popular extension, you can improve the text-display speed of all your programs by opening the ATM control panel and increasing the size of the font cache.

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MacUser, June '90

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System Folder and an application program, consider using the RAM disk to hold just the application program. The program will open and run at top speed. PowerBook users will still see some battery savings, too, since the PowerBook won't need to access its hard drive as frequently. If there's room, you can store the documents you create on the RAM disk, too, although the hard drive remains the safest place for them.

Extensions, Control Panels, and Memory

I MENTIONED EARLIER THAT SYSTEM extensions—those programs that load during start-up, displaying icons along the bottom of the screen—nibble away at your free RAM. Keep this in mind next time you're tempted to add an extension that promises to boost your productivity or make you chuckle. Flashy extensions or control panels such as After Dark or Bruce Tomlin's SoundMaster (which plays sounds when you insert and eject disks, throw away files, and perform other activities) are especially RAM hungry, as are electronic-mail extensions such as CE Software's QuickMail and Microsoft Mail.

When you're running low on free RAM, disable any extensions you can do without (extensions you *can't* do without might include ones required by a piece of hardware such as a cartridge drive, scanner, or video board). In System 7 you can disable extensions or control panels by manually dragging them out of the Extensions or Control Panels folders, both located in the System Folder. An easier way is to use Ricardo Batista's Extension Manager, a free control panel that lets you activate and deactivate extensions and control panels. Several commercial extension managers are also available.

After you disable some extensions or control panels (whether manually or with an extension manager), choose Restart from the Finder's Special menu. You can also temporarily disable all extensions by restarting and holding down the shift key until you see the "Welcome to Macintosh" message with the text "Extensions off" below it.

System Software and Memory

SYSTEM 7'S FILE-SHARING FEATURES (discussed in last month's column) require nearly 300K of RAM. If you aren't using file sharing, turn it off with the Sharing Setup control panel. The Mac will run slightly faster, too.

If you're using one of the original versions of System 7—version 7.0 or 7.0.1—you might want to get a copy of Apple's System 7 Tune-Up extension, which

continues

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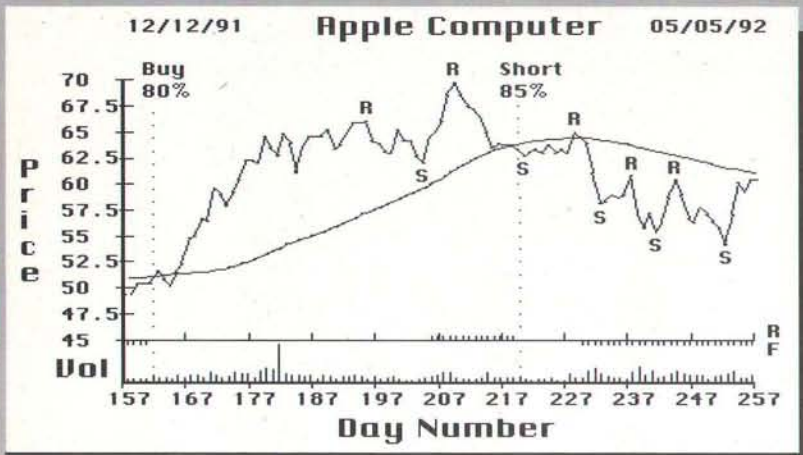

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All programs not available on all computers.

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modifies the system software to use memory a bit more efficiently and to handle low-memory situations better (Tune-Up's features are included in System 7.1). If there isn't enough memory available to start a program, for example, the Finder asks if you want to quit a different program in order to make room. Similarly, if there isn't enough memory to print a document in the background (that is, while you continue to work), the Mac asks if you want to print it immediately or wait until later. Use the About This Macintosh command to find out which system version you're using. If a bullet character (•) appears after the version number, the tune-up is already installed.

If you use the built-in video port on a Mac IIci or IIsi, you can also free some memory by using the Monitors control panel to switch to the black-and-white (monochrome) display mode. The IIci and IIsi use part of their main RAM to store the bits that represent the screen image. With a standard 14-inch monitor in the 256-color display mode, this *screen buffer* requires up to 320K. In monochrome mode, the buffer requires only 38K. This tip doesn't apply to any other color Macs, current or discontinued—they provide separate video memory, called *VRAM.*

Of course, the best way to avoid running out of memory is to buy more of it—RAM prices have never been better. If you have a Classic, Plus, or SE, upgrade to 4MB. If you have a PowerBook other than the 100, upgrade to at least 6MB (preferably 8MB) to take advantage of a RAM disk. If you have a color Mac, an SE/30, or a Classic II or Performa 200, consider upgrading to 8MB—or beyond, especially if you work with color scanned images, digital sound, or QuickTime movies. (If you add more than 8MB to a Mac II, IIx, or IIcx, use the Mode32 system extension to access all the RAM. It's available free through user groups, Apple dealers, and online services.) For details on adding memory, see "How to Keep Your Mac Current," *Macworld,* May 1992.

But even a hefty RAM upgrade will probably only keep the low-memory messages at bay for a while. They'll return as you acquire increasingly complex programs and become accustomed to running more of them at once. When that day arrives, remember the techniques I've described here—they can help you cram more into your RAM. **m**

Contributing editor JIM HEID looks at a different aspect of Mac fundamentals each month. He covers System 7 and 7.1 in his latest book, the second edition of *Inside the Apple Macintosh* (Brady, 1992), which he coauthored with Peter Norton.

POWER TRIP

At the office, in the air, at home, or on the road, you want high-powered PowerBook solutions to get the most out of your portable computing. TechWorks' **PowerRAM**™ Memory and **Spiral**™ note taking software are the perfect companions for Macs on the go.

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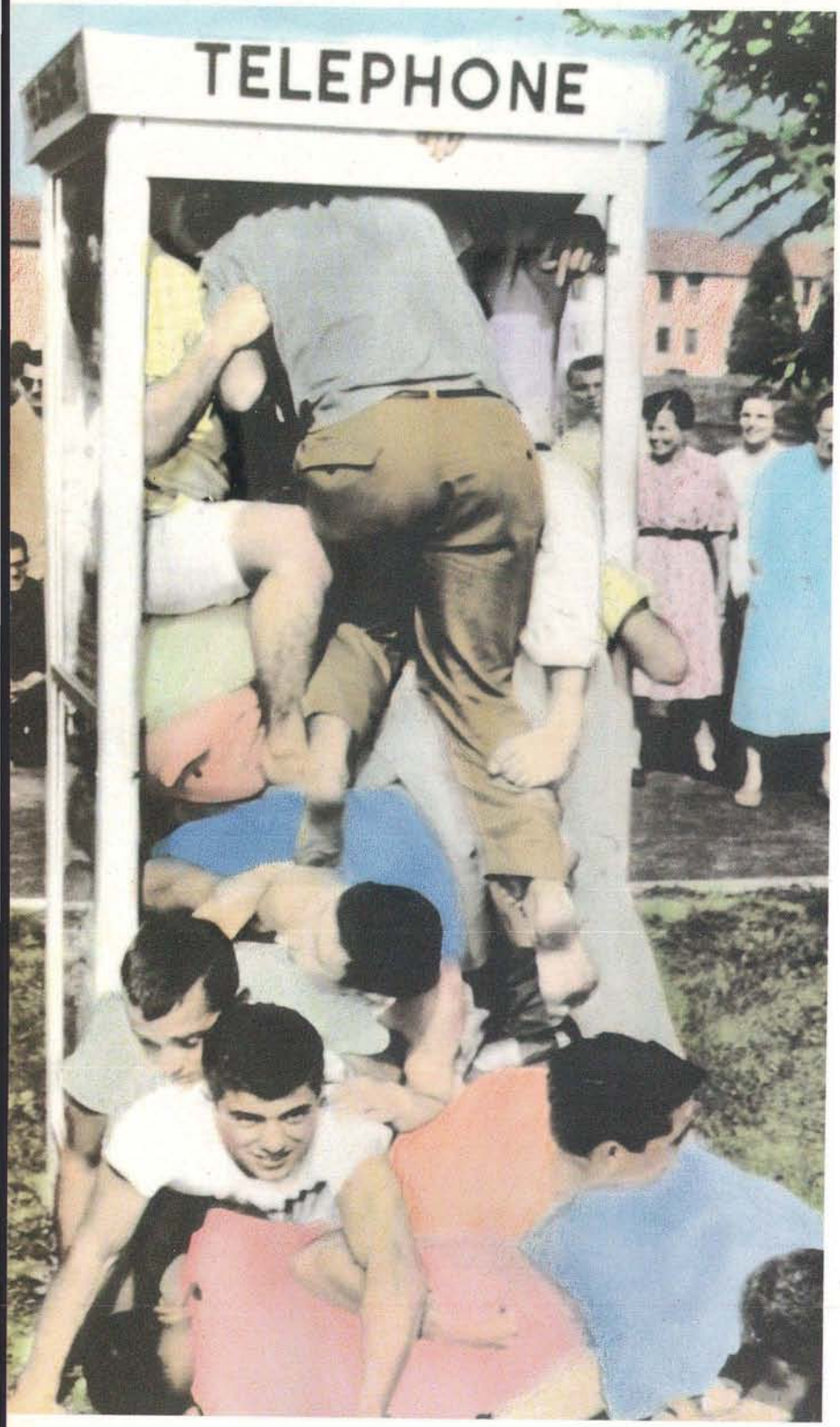

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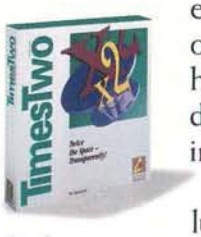

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BY CARY LU

PowerBook Notes

Building a Lean, Mean Machine

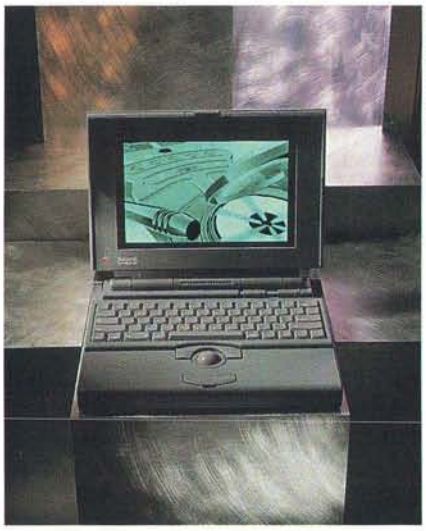
WHEN YOU SET UP A POWERBOOK COMPUTER, you can choose between two visions of what a portable computer can be—an extravaganza with nearly all the bells and whistles of a desktop computer, or a lean and mean machine that has just the essential tools.

If extravagance is your style, a PowerBook with sufficient extras will serve you well. One great advantage of the PowerBooks is that they are full-fledged Macs, just as capable in most ways as a desktop Mac. You do have to pay for extra features and put up with such inconveniences as slow start-up, and desktop frills typically require extra hard drive space and RAM. You also need some tolerance for system crashes. The more things you run, the more likely some software will break. See the feature "Expanding Your PowerBook" in this issue if a PowerBook is your sole Mac and you want everything on it.

Personally, I tend to be a minimalist. I think of the PowerBook as *portable;* on the road, I want simplicity and an immediacy that disappeared long ago from my desktop Mac. I turn on my desktop Mac once a day; if it takes two minutes to start, I don't really care. I want my PowerBook ready in an instant to take notes or retrieve information for a meeting. Therefore I forgo all the tricks of my desktop Mac in favor of the essentials. As a result, I can live with much less RAM and hard drive capacity in a PowerBook. But I am not a pure minimalist; I do add a few extras. This thing is a Mac, after all.

Getting Started

HOW MUCH RAM DO YOU REALLY NEED? If your PowerBook has 2MB of RAM, add at least another 2MB. That's usually enough for normal operation, and 4MB will support—just barely—a RAM disk. If you must run multiple applications simultaneously, though, 4MB won't be enough. (PowerBook 100 users may be able to squeak by with only 2MB if they install System 6, as discussed later.)



PAUL FRANZ-MOORE

With a desktop Macintosh, I can't imagine that I will ever have a big enough hard drive. Yet for a PowerBook, even one of Apple's discontinued 20MB drives can be sufficient if you plan carefully. See if you can live with the drive's size before rushing out to replace the drive.

And make sure you can take advantage of all of your hard drive's existing storage capacity. That means repartitioning the drive, because most Macintosh drives—desktop and PowerBook alike—have unused free space. See "How to Unlock the Hidden Storage on Your Hard Drive" for a step-by-step guide to freeing up that space.

Pruning the System Folder

TO BUILD A LEAN, MEAN POWERBOOK machine, you should cut the fat from the System Folder. Apple's standard installation (Easy Install) of System 7 and 7.1 includes many files that aren't necessary for operation. If you choose Customize and Min System, you get a few unnecessary files and some that you do need. By tossing out unnecessary files, you not only save some drive and RAM space but the PowerBook will start up faster as well.

Actually, you should copy these files to a floppy before you trash them, although you can always restore them from the System floppy disks. Not all these files are on all PowerBooks; use the Find command under the File menu in the Finder to search if necessary.

I'm assuming here that you have done either Easy Install or a standard System install for your Mac model. My trimming was done under System 7; 7.1 savings are in parentheses.

Starting alphabetically in the System Folder, you can toss several Apple menu items: Alarm Clock, Calculator, Note Pad, and Puzzle. (I've kept Key Caps, although you may not need it.) Total savings: 53K (59K in System 7.1).

You can also toss a surprising number of control panels without ill effects. Many are only necessary for setting parameters that you rarely if ever change—and when you need one, you can run it directly from a floppy disk. Map serves no real function. Easy Access helps only if you need to operate the computer one-handedly. Keyboard, Mouse, Labels, and Sound are only necessary to make a change. Similarly, you can remove Date & Time and Numbers, which come with 7.1. Startup Disk lets you start up from an external hard drive. Keep it if you will be using a RAM disk; otherwise, toss it.

Views is also dispensable. Monitors serves two functions. If you have a PowerBook 160, 180, 210, or 230, Monitors lets you set the gray levels on your display. If

continues

you use an external monitor—either through a built-in video adapter or a docking assembly—Monitors lets you manage both displays. For the majority of PowerBooks in use today, Monitors serves no function. Similarly, Color can go unless you have an external display that needs it. The three control panels that deal with file sharing—File Sharing Monitor, Sharing Setup, and Users & Groups—are optional as well. Two more drastic cuts are General Controls and Memory, yet once you have established basic settings and are willing to accept default memory settings, you don't need them. If you toss all these control panels, you can save 201K to 263K. (You can even cut the control panel for the Portable or PowerBook because it isn't absolutely essential, but its control of automatic sleep mode and hard drive operation timing is truly valuable for PowerBooks.)

The Extensions folder contains many optional items as well. Chances are you no longer need Finder Help, the balloon help for Finder. If you need remote access to large computer databases, keep DAL; otherwise toss it (and DAL Preferences in the Preferences folder). Caps Lock (5K) isn't essential, but I find a caps-lock-on indicator in the menu bar is handy, so I've left it on my PowerBook (some recent PowerBooks have an indicator light). Three extensions support file sharing: File Sharing Extension, Network Extension, and AppleShare. If you don't share, you can toss all three, for a total savings of about 331K.

PrintMonitor supports background printing; you can print fine in the foreground without it, and many users rarely print from a PowerBook anyway. You can toss every printer driver except the one you use. You might need a different one if you are traveling and encounter another kind of printer, but you should be able to find any necessary driver on one of the Macs connected to that printer. You do not actually need any printer driver if you are not printing from the PowerBook, but you might want at least one because some applications check for the installed driver to set page margins and pagination. You could select the driver with the smallest size—ImageWriter (46K)—but because setting up on one type of printer and then printing on another sometimes results in changes to page breaks and other spacing, you should install the driver for the type of printer that you use most often. The LaserWriter driver is the most common choice, despite its 218K size.

Voilà: a savings of nearly a megabyte in the Extensions folder alone.

The Font folder contains more dispensable items (it's the Font folder in System 7.1; the System file itself in System 7). First, you can toss out all the sounds, thus saving 20K. When the Macintosh needs to alert you, it produces a beep instead of a distinctive sound—no loss. Standard installation of System 7 includes 1086K of fonts in TrueType format (1189K in System 7.1). You can certainly eliminate some of these, and if you principally work with PostScript

continues

How to Unlock the Hidden Storage on Your Hard Drive

If your Macintosh—desktop or PowerBook—came with a hard drive from Apple, it probably has some hidden storage capacity. I checked a dozen Macs with 40MB hard drives; the hidden storage ranged from 980K to 3.9MB. I found 1.6MB of hidden storage on PowerBook 140s and 170s with 40MB drives; 1.4MB of hidden storage on PowerBook 100s with 20MB drives. Some 160MB drives have as much as 15MB hidden.

Recovering this hidden storage capacity is simple—all you need to do is repartition your disk with the Disk Tools floppy disk that comes in the set of System disks. The procedure is tricky enough that many people say it cannot be done except with a third-party formatting program. Not true; everything you need is right on the System disks.

If you perform this process on a PowerBook, do it while connected to an AC power supply. A battery failure would be inconvenient, to say the least.

1. • First, start the Mac with the Disk Tools floppy disk.
   • Launch Apple HD SC Setup.
   • Select Partition.
   • Select Custom.
   • A map of the disk's partitions appears. At the top is the driver, occupying 16K. In the middle is the available space. At the bottom, in gray, is the "extra" space.
   • Select Details.

The window shows any available storage as free space. If there isn't any, then the disk is already partitioned for maximum capacity.

   • Select OK, then Done, and Quit *without making any changes.*

2. • Now, back up the hard drive. *If you don't, and something goes wrong, you—or at least your data—are dead meat.*
   • Restart with the Disk Tools disk, launch Apple HD SC Setup, and select Partition and Custom.
   • This time, click on the name of your hard drive in the map.
   • Select Remove.
   • At the warning "continuing will destroy the data..." select OK (you did back up, right?).
   • The entire disk map should now be gray except for the driver at the top. Put the mouse pointer just below the Driver partition; click and drag the partition down to the bottom. (If you select the Driver partition by accident, select Done and start over.)

3. • Now a new screen asks you to select the type of partition. Choose Macintosh Volume. You can change the size. You can specify the entire drive space, or you can leave a small area—a kilobyte or two—as free space in case you want to install another partition in the future. Changing partition sizes is easier than creating an entire new one.
   • Select OK.
   • When you get the message "Partitioning was successful," select Done, then choose Quit.
   • Restart the Mac and enjoy the extra space. If you want an easier method, try a third-party formatting program such as Hard Drive TuneUp from Software Architects (206/487-0122), Hard Disk Toolkit from FWB (415/474-8055), or Drive7 from Casa Blanca (415/461-2227).

Why does Apple leave hidden space in its drives? Apparently to round off the drive sizes. Apple gets 40MB drives, for example, from many sources, and the actual capacity varies from 41MB to 45MB. Apple simply partitions and sells them all as 40MB drives.

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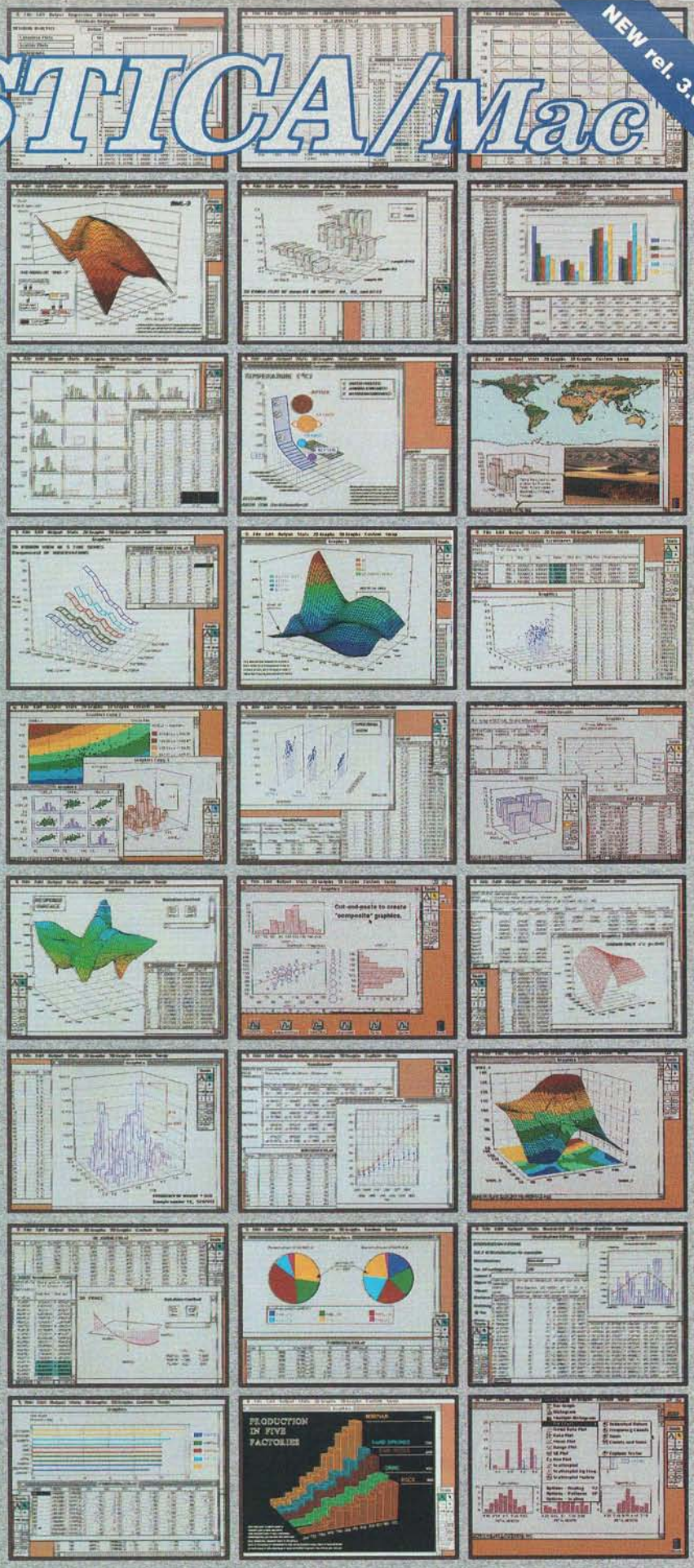

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fonts, you should probably toss out every font except those needed by the System. This saves you at least 960K of space; you will need to add the PostScript fonts of your choice, however, so that your net savings will be smaller.

If you standardize on PostScript, you may want to add Adobe Type Manager, which takes up 121K of drive space (165K for ATM version 3, which is needed for 7.1) and at least 96K of RAM (the exact amount depends on the size you set for ATM's font cache). You might try working without ATM first, and add it only if you need it. If you print with a PostScript printer, ATM only affects the legibility of scaled fonts on screen; printed text looks fine. If the printer does not have PostScript, then ATM is necessary for producing clean output from PostScript fonts, but in this case you might as well use TrueType fonts instead. On the other hand, you may print mainly on PostScript printers but occasionally on non-PostScript printers when you are traveling; then using ATM is better than mixing TrueType and PostScript fonts.

If you do mix TrueType and PostScript, you might want to keep Geneva and New York, TrueType fonts that have no PostScript equivalents. It is especially important to be sure that Times, Helvetica, Palatino, and Courier are not installed as TrueType on some Macs you use and as PostScript on others.

The result of all this pruning is a System Folder that can be as small as 1101K (1129K for System 7.1), compared with more than 3700K for Apple's standard Easy Install System Folder. Now you probably won't want to toss out every possible file and font; most of them do useful things, after all. But you should consider such a stripped-down System Folder if you are squeezed for space. This minimalist approach is also useful for setting up a RAM disk, an essential feature even for the PowerBook user who has everything else.

Speedier Computing

A RAM DISK IS A PORTION OF RAM THAT IS set aside to behave like a disk drive; it's created using the Memory control panel (see "Getting Started with Memory-Maximizing Tips" in this issue for more on RAM disks). To save power during battery operation, PowerBooks are normally set to turn off the hard drive after several minutes of inactivity. When it's time to save a file or retrieve information, you may have to wait for the hard drive to spin up—and it consumes appreciable power in the process. To avoid this wait and save power, you should try a RAM disk, which is much faster than a hard drive.

Caution: RAM is volatile; a RAM disk's contents disappear when the power is switched off or lost. Among the PowerBooks, only the 100 accepts a RAM disk gracefully because its batteries supply continuous power to the RAM even when the computer is shutdown. (That's because the PowerBook 100 ROM was derived from the original Mac Portable, whose large battery also supplied continuous power to RAM.) For all other PowerBooks, the RAM contents disappear during shutdown, one reason to use sleep mode rather than to shut down, when possible.

You can store anything on a RAM disk that you can on a real disk—subject to storage capacity, of course. The ideal RAM disk contains a System Folder, applications, and documents, allowing you to bypass a hard drive altogether—or nearly so. For the safety of your data, copy your documents from the RAM disk to the hard drive from time to time. Battery life goes up considerably with

continues

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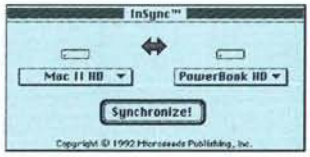

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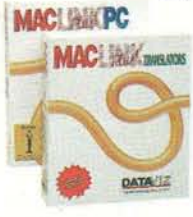

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a RAM disk—some people report up to five hours of computing when a screen's backlight is also used sparingly.

If you have 6MB or more of RAM, you can easily create a RAM disk of 2.5MB to 3MB and operate the PowerBook from a System Folder on either the RAM disk or the hard drive. Use the hard drive System Folder when you're plugged into AC power; this folder can have all the resources that you need. The System Folder on the RAM disk can usually be stripped down since you probably don't need that many features during battery operation. You can use the control panel called Startup Disk to move between the hard drive and the RAM disk.

If you have just 4MB of RAM, you can still have a self-contained RAM disk, you just have to plan carefully. Create a 2112K RAM disk; this leaves 2028K available. Then install a completely stripped System 7 folder (from the System installation disks, select Custom and then Min System for your model). After you toss an extraneous file or two, you are left with 848K of RAM disk space under System 7 (803K under System 7.1).

What can you do in 848K of space? Word processing is the most popular application. Microsoft Word 5.0 just barely fits, leaving no room for documents or even saving a Preferences file, and Word 5.1 does not fit at all. So if you are a Word user and don't want to switch to another program, then use Word 4, which needs 670K of disk space, leaving 180K for documents. The Word 4 file format is compatible with Word 5.

Maybe you should change programs; both WriteNow 3.0 (T/Maker, 415/962-0195) and Nisus Compact 3.31 (Nisus Software, 619/481-1477) load completely into memory and do not need to be in the RAM disk at all. Once launched from a hard drive, neither program needs to go back to the drive except for documents. In practical terms, this means that you can use more space on the RAM disk for documents or other applications. WriteNow is smaller (287K on disk, minimum 325K memory partition) than Nisus Compact (370K on disk, minimum 499K memory partition) because WriteNow does not necessarily load a document completely into memory as Nisus does.

Whatever you do, think twice before you go out to buy a program just for RAM disk use; perhaps you should spend that money on more RAM instead.

And don't forget that you can still run other programs, control panels, and Apple menu items (desk accessories) from the hard drive even if you start the PowerBook from a RAM disk. On the other hand, the only way to completely avoid turning on the hard drive is to throw the hard drive icon in the Trash (it will reappear after a restart).

If you have the space, you can keep a copy of your RAM disk on the hard drive so you can re-create the RAM disk quickly if necessary. But this means you will have duplicate files on your hard drive, and a duplicate System file can cause trouble. To solve that problem, you can create a folder with every RAM disk file except the System file. If you don't have that much hard drive space, simply mark each component of the RAM disk with a Finder label for easy retrieval. If your System Folder is small enough, you can keep it on a floppy disk. Managing a RAM disk is much easier with System 7.1's separate font folder than with System 7's practice of storing fonts inside the System file itself.

System 6

IF YOU HAVE A POWERBOOK 100, ANOTHER way to cut down the size of the System Folder is to install System 6 instead of System 7, on both the hard drive and a RAM disk. The readily available versions of System 6 do not handle power management

continues

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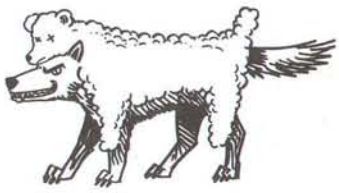

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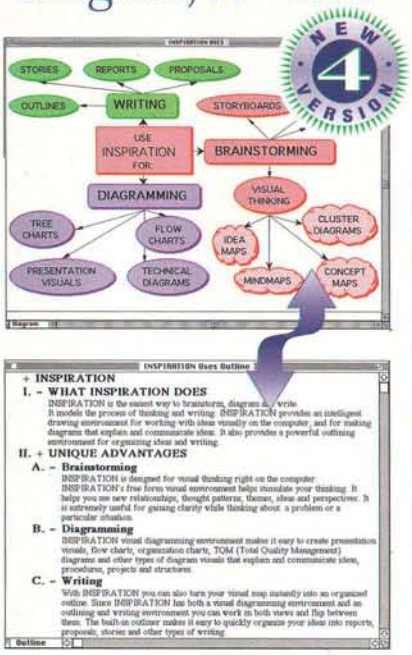

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and the screen brightness correctly, however. System 6.0.8L, produced by Apple for sale outside the United States, fixes these glitches for the PowerBook 100 and adds support for the SCSI disk mode. Unfortunately, there's no official way to get 6.0.8L inside the United States, although it's available in Canada. A minimum System 6.0.8L folder takes up only 410K, some 700K less than a minimum System 7 folder. A full installation of 6.0.8L without printer drivers takes 876K.

You can combine the best of both worlds on a 4MB PowerBook 100 by installing System 7 on the hard drive and creating a 1.5MB RAM disk with a minimal System 6.0.8L. You still have 1MB of RAM disk space available and 2.5MB of main RAM, which is enough for many applications even under System 7. The two Systems have no difficulty sharing files, but they cannot share System resources such as control panels.

(If you have a PowerBook 140 or 170, in practice you cannot run System 6. A few accomplished system software people have converted KanjiTalk 6.0.7.1, a Japanese version of System 6, to be able to run English-language software on the 140 and 170. The conversion process is difficult and incomplete, although the result is operational. Originally this issue about System 6 came up because of delays in the release of System 7 KanjiTalk. KanjiTalk 7 is now available, so newer PowerBook models will not run System 6.)

Sleepy Time

IN ITS POWERBOOK MANUALS, APPLE offers much worthwhile advice on how to avoid trouble. But I find some of its advice too conservative.

Here's one example. A PowerBook comes out of sleep mode much more quickly than it boots from a cold start. Apple says that PowerBooks should be shut down before moving them, and that sleep is suitable only for a stationary unit. The idea is that an accidental keystroke might turn on a sleeping computer during transit, and the hard drive might be damaged. Even so, many people have taken to carrying around their PowerBooks in sleep mode, and the Apple PowerBook managers I spoke to consider the advice overly cautious if not an outright error. (On the PowerBook 100, pressing any key turns on the computer anyway, from either an off state or sleep mode, so there is no difference in risk for accidental start-up with that model.) For safety's sake, save important files to the hard drive before putting the computer to sleep. (And please don't send me the repair bill if your computer gets damaged.)

Plugging In Peripherals

APPLE'S MANUALS ARE SOMEWHAT UNclear about when you can connect devices to, and disconnect devices from, a PowerBook. PowerBooks have three states: on, off, and sleep. You can connect or disconnect any device when your computer is turned off. According to sources I spoke to that make PowerBook peripherals, you can connect or disconnect the AC power adapter and serial port devices at any time, regardless of whether the computer is on, off, or in sleep. According to engineers who develop them, you can connect ADB devices, such as numeric keypads, during sleep; if the device is not a mouse, keyboard, or numeric keypad, you may need to restart the computer for it to recognize the device. Don't plug in an ADB device while the computer is on—you run the risk of shorting the plug and blowing a tiny fuse in the computer. And if you go to an Apple dealer for repairs, you'll have to replace the main logic board, an expensive proposition. A third-party repair shop can replace the fuse for much less money.

Virtually all my sources say to shut down the PowerBook before connecting or disconnecting floppy disk and SCSI connectors. Otherwise, you might have another potentially expensive repair. A few brave souls say that they routinely connect and disconnect SCSI devices without shutting down, only restarting the PowerBook to recognize the device. They do it to preserve the RAM disk—but I wouldn't.

Airport Advice

THE APPLE POWERBOOK MANUAL SAYS "Do not allow your computer or any hard drives or floppy disks to pass through X-ray machines. Have security officials manually inspect your computers and disks." As far as I can tell, there is no basis for this advice; X rays do not appear to damage magnetic media or any other computer component. Some people suggest that the problem is not with the X rays but with the magnetic field produced by the motor driving the conveyor belt through the X-ray machine. I can't find any verifiable reports of damage, however. Engineers who work for computer and disk manufacturers routinely run their computers and disks through X-ray machines, and so do I.

If your experience is different, please share it with me, and any other tips or tricks that make your PowerBook more effective or fun. **m**

CARY LU got his first Mac in the summer of 1983. He is the author of *The Apple Macintosh Book* (Microsoft Press, 1992).

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3-D/3-D ANIMATION

★★★ **Alias Sketch 1.0.2 (1.5), Alias Research, 800/447-2542, $995.** The unique collection of tools makes this the only program that allows you to sit down and play with 3-D rendering. Failings include quirky navigation and sluggish performance. **Aug 92**

★★★★ **Animation Clips 1.0, Media In Motion, 415/621-0707, $99.** Spice up a presentation with an animated stapler, a jukebox that's a work of art, or any of 58 other customizable animations from these business-oriented packages. Marred only by some choppiness and a few lesser-quality animations. **Jun 92**

★★★★ **ElectricImage Animation System 1.5.1, Electric Image, 818/577-1627, $7495.** The most powerful animation program for the Mac improves its documentation and rendering, and adds an intuitive project window that allows you to control all aspects of animation from a single location. Unfortunately, it still retails for the price of a European vacation for two. **Feb 93**

★★★★ **Infini-D 2.0, Specular International, 413/549-7600, $995.** Rich combination of 3-D modeling, rendering, and animation tools at a relatively affordable price. Visualization program works well; offers a nicely integrated approach to rendering; and is generally stable. **Jan 93**

◩ **MacRenderMan 1.0 (1.3), Pixar, 510/236-4000, $695.** This dedicated renderer provides an extremely sophisticated, albeit sometimes difficult, way to generate 3-D images. Currently the most widespread rendering scheme, it uses algorithms to create textures, bumps, lights, fog, and practically every other element of an image.

★★ **Motion Works Promotion 1.0 (1.02), Motion Works, 604/685-9975, $395.** Inexpensive animation program consolidates a slew of tempting features, including flexible path tools and ambitious support for Apple events, but the capabilities are strung together with a weak and problem-ridden interface. **Nov 92**

★★★★ **Ray Dream Designer 2.02 (2.04), Ray Dream, 415/960-0765, $895.** Experienced 3-D aficionados will find this 3-D–imaging software a welcome addition to their arsenal, and beginners may find it ideal for the leap from two dimensions to three. Improved text-handling and viewing capabilities would make it even better. **Sep 92**

★★★ **Showplace 1.1 (1.1.1), Pixar, 510/236-4000, $695.** Straightforward graphics application organizes shading and rendering processes into five basic components. Beginners will like the simple interface, but the feature set is small for experienced users. **Jun 92**

◩ **Swivel 3D Professional 1.0 (2.0), Macromedia, 415/252-2000, $695.** Relatively unusual cross-sectional technique makes this 3-D modeler a great tool, especially for fast prototyping. It provides a quick and easy way to create a variety of shapes.

ACCOUNTING/FINANCE

★★ **Business Sense 1.6, Business Sense, 307/877-2231, $199.** Competent, single-user, all-in-one bookkeeping package will adequately help you keep the books for a small company, but it's not as easy to use as its competition. **Feb 93**

★★★★ **Components 1.0, Satori Software, 206/443-0765, $795 per module.** Simple, flexible architecture sets a new design standard for Macintosh accounting software, but is not without its bugs and flaws. **Sep 92**

◩ **Great Plains Accounting 6.0 (6.1), Great Plains Software, 701/281-0550, $795.** High-end bookkeeping software offers a first-rate lineup of dedicated modules. Different individuals or groups can easily use the various accounting functions.

★★ **HyperTax Tutor 1991, SoftStream International, 508/991-4011, $99.** If you're willing to put up with a design that's neither intuitive nor easy to use, this cross-referenced book contains extensive explanations, strategies, and examples of complex IRS tax laws. **Apr 92**

★★★ **Job Cost/Time Billing 1.05, Satori Software, 206/443-0765, $1495.** Professional billing software incorporates high-end job-cost and accounts-receivable features in one module, plus an excellent report function; but confusing elements, minor bugs, and inaccuracies in the documentation are weaknesses. **Aug 92**

★★★★ **MacInTax 1991, ChipSoft, 619/453-8722, $79.95.** On-screen replicas of IRS forms ease the preparation of tax returns in this personal income tax software, but the help text (lifted from IRS documents) is unclear. **Apr 92**

★★★★ **Managing Your Money 5.0, MECA Software, 203/256-5000, $79.95.** An already strong financial-management program becomes easier to use and slightly more powerful with this upgrade. **Jan 93**

◩ **MYOB 3.0, Teleware, 201/586-2200, $249.** A file-cabinet metaphor makes the interface of this accounting package easy to use and understand. For an accounting system with one user, who has no need for payroll capabilities, it's the best choice.

◩ **Quicken (3.0), Intuit, 415/852-9696, $69.95.** Track assets, liabilities, income, and expenses with this personal-finance package. It has a good Mac interface and is easy to learn and use.

★★★★ **Timeslips III 2.1, Timeslips Corp., 508/768-6100, $299.95.** Complexity is the price you pay for this time-billing utility's impressive flexibility. Fortunately, thorough documentation, excellent tech support, and default settings help any user get started. **Sep 92**

BUSINESS TOOLS

◩ **4th Dimension 2.0.10 (2.2.3), ACIUS, 408/252-4444, $795.** The truly high-level computer language of the database still allows control of small details in data representation and display, but to exploit all of its features, you need a programming background.

★★★★ **Atlas Pro 1.0.6 (1.5), Strategic Mapping, 408/985-7400, $795.** Although this mapping software is not a complete geographic-information system, it boasts a rich feature set and competitive price. **Nov 92**

◩ **Claris Resolve, Claris Corp., 408/727-8227, $249.** Advanced features come within easy reach of spreadsheet pedestrians with this program. Anyone can learn how to use it in 10 minutes and how to customize it in 20.

★★★★ **DataPivot 1.02 (1.1), Brio Technology, 415/961-4110, $299.** Convenient and flexible report-generator includes fast formatting, automatic import, and almost every other item on the wish list of users who need report tables that emphasize cross-tabulation. **May 92**

★★★★ **Fair Witness 1.1 (1.2), Chena Software, 215/770-1210, $295.** A valuable tool for planning any project, this software coherently integrates outlining, information charts, scheduling, and time charts. **Oct 92**

★★★★ **FileMaker Pro, Claris Corp., 408/727-8227, $399.** Easier scripting, improved mailing labels and text-handling, and support for QuickTime and Apple events are the major new features of this upgraded, multiuser, flat-file database. Although it has some minor bugs, this is a strong upgrade to an excellent program. **Jan 93**

★★★★ **GeoQuery 3.02, GeoQuery Corp., 708/357-0535, $395.** Gain geographic perspective with this custom-map generator and data-analysis software that uses zip codes to create pushpin-style maps of files from your spreadsheet or database. **Nov 92**

★★★★ **Inspiration 4.0, Inspiration Software, 503/245-9011, $295.** Watch your ideas evolve in a dynamic diagram mode and a text-based outline mode with

continues

MACWORLD

Star Ratings

this brainstorming tool. It works best as a vehicle for organizing and developing ideas. **Feb 93**

★★★★ **Lotus 1-2-3 for Macintosh 1.0 (1.1), Lotus Development Corp., 800/343-5414, $495.** Spreadsheet program from the other side holds its own against Mac competitors. Its many strengths include graphing, well-implemented linking, compatibility with the DOS version, and an outstanding Help system. **Apr 92**

MacProject II, Claris Corp., 408/727-8227, $599. Draw task boxes and connect them with lines that define project logic using this project-management software. It links with Resolve to produce seven types of graphs and tables, but other programs offer more elaborate reporting and scheduling options.

★★★★ **Microsoft Excel 4.0, Microsoft Corp., 206/882-8080, $495.** Create impressive spreadsheets with this upgrade that includes all the features you wished for and more. It's slower, and now needs 2MB of RAM for practical use, but almost all users will want to upgrade. **Oct 92**

★★★★ **Microsoft Project 3.0, Microsoft, 206/882-8080, $695.** An amazing range of functions, including newscheduling and formatting, are packed into this upgraded project-management software. The improved tool bar helps novices schedule tasks with push-button ease. **Jan 93**

★★★★ **Muse 1.0 (1.01), Occam Research Corp., 617/923-3545, $695.** Innovative data-analysis software is based on a large, ambitious vision of how to organize and use data, and is an excellent environment for some data handling. Free-form query language is powerful, but easy to misread. **Jun 92**

★★★★ **nuBase Pro 1.5 (1.54), Tactic Software Corp., 407/832-6691, $395.** Although still slower than FoxBase and without the rich feature-set of 4th Dimension, this is the only relational database that makes it possible for users with no programming experience to design a useful database. **Sep 92**

★★★ **Office Manager 2.1 (2.2), White Crow Software, 802/658-1270, $99.** Simple contact- and project-management software is powerful for small databases, but reliance on HyperCard limits its use for low-end Macs. **Dec 92**

★★ **Office Wiz 1.1 (1.1.2), Oryx Associates, 415/563-9971, $695.** 4D-based program attempts to integrate calendar and project- and contact-management, as well as simple accounting for a multiuser environment, but the complexity of the interface requires a substantial investment in start-up time. **Nov 92**

★★★ **Omnis 7 1.1, Blyth Software, 415/312-7100, $1250.** The plain, businesslike functionality of this database-development system produces solid applications without much fuss. **Dec 92**

★★★★ **Panorama 2.0 (2.06), ProVue Development Corp., 714/892-8199, $395.** Disarmingly easy-to-learn flat-file database is full of labor-saving data-entry features, plus it boasts a remarkable macro function that lets you record and play back almost any series of database routines. **May 92**

★★★ **Perspective 1.5, U.S. Data on Demand, 800/352-7352, $129.95.** The level of detail and comprehensive information in this collection of U.S. demographic and economic data is impressive, and the reasonable price puts it within reach of even the smallest business. **Sep 92**

★★ **PowerPlay 1.0 (1.1), Cognos, 617/229-6600, $695.** A good program for a very limited range of business-analysis tasks. The views of data and graphs are small and manageable, and the program tabulates them in several colorful ways. **Aug 92**

CAD/DRAFTING

★★★★ **ArchiCAD 4.02 (4.1), Graphisoft USA, 415/737-8665, $4450.** The simple yet powerful 3-D interface in this CAD package builds on a construction metaphor. The integrated product incorporates most features that an architect needs. **Jun 92**

★★ **AutoCAD Release 11, Autodesk, 415/332-2344, $3500.** Customizable, bare-bones drafting upgrade partially implements a graphical user interface. Few add-ons are currently available. **Dec 92**

Claris CAD, Claris Corp., 408/727-8227, $899. Serious but basic CAD package has fallen behind the competition after a long period without an upgrade. Still, it's one of the fastest products available for scrolling and zooming—important for work on large, complex drawings.

★★★ **DesignCAD 2D/3D 3.0.1, DesignCAD, 918/825-4848, $299.95.** Despite slow rendering, this general-purpose 3-D modeler with 2-D drafting capabilities represents a price and performance breakthrough in 3-D modeling programs. **Nov 92**

DESKTOP PUBLISHING

Adobe Type Manager (ATM) 1.0 (2.03), Adobe Systems, 415/961-4400, $99. Radically improve the quality of screen fonts and the versatility of QuickDraw printers with this font-optimizing utility that uses information from a printer font (also called an outline font) to produce accurate character representations on-screen.

★★★ **Aldus PageMaker 4.2, Aldus Corp., 206/628-2320, $795.** Interruptible screen redraw is one of the dozens of enhancements that make this upgrade well worth its price. Even so, some of the features that users need the most—opening multiple documents, for instance—are still missing. **May 92**

★★★★ **Fontographer 3.5, Altsys Corp., 214/680-2060, $495.** Versatile tools that allow you to edit PostScript typefaces or create your own are the highlight of this font-design software. But beware, some processes are technical and cumbersome. **Nov 92**

FrameMaker 3.0 (3.0.1), Frame Technology, 408/433-3311, $795. Powerful and well-designed, this page-layout software is the best choice for scientific and technical publishing. It has a fine table editor and allows manual kerning, but its power demands commitment—and a Mac II–class machine.

★★★ **LetraStudio 2.0, Letraset USA, 201/845-6100, $249.** Precise, intuitive control over character spacing and shapes, as well as a straightforward interface, make this program a great choice for manipulating type, but it lacks flashy effects, such as gradient fills. **Oct 92**

★★ **MacQuill 1.0, Nest Software, 408/441-1944, $99.95.** Friendly, inexpensive page-layout program is missing basic features, such as kerning and importing, and suffers from some bugs and deficiencies, but for simple word processing and grass-roots page layout it's serviceable. **Aug 92**

★★ **MenuFonts 4.03 (4.04), Dubl-Click Software, 818/888-2068, $69.95.** A control panel device that groups type styles in families and displays font names in their own typefaces sounds like a great idea, and it would be if there were fewer incompatibilities. **May 92**

★★★★★ **Multiple Master Myriad 1.0, Adobe Systems, 415/961-4400, $370.** Elegant execution and functional design combine in this two-axis Multiple Master typeface that exceeds all previous ideas of electronic font perfection. **Jul 92**

Publish It Easy 2.12 (3.0), Timeworks, 708/559-1300, $199.95. Fast even on the slowest Macs, this page-layout program sports a comprehensive mix of features that may eliminate your need for a separate drawing or even database program. But some bugs and a daunting complexity mar this otherwise versatile program.

★★★★ **QuarkXPress 3.1, Quark, 800/788-7835, $895.** Dozens of updated features and frustration-relievers in this upgrade include new palettes and preferences, better zooming, and improved text-editing and -formatting. The program, while still not perfectly behaved, is stable, well designed, and full-featured. **Jul 92**

★★★ **Renaissance 1.0, Eastman Kodak, 800/433-2839, $695.** A strange mixture of power and oversight, this page-design and -layout software provides several slick features, including handling multiple page sizes simultaneously, but blatantly ignores common Mac conventions, such as some keyboard shortcuts. **Dec 92**

★★★★ **Spectacular 1.2, FontHaus, 203/846-3087, $79.95.** Keep track of your fonts efficiently and effectively with this type-specimen generator. Printing specimen sheets is a cinch. **Jan 93**

★★★ **Typestry 1.0, Pixar, 510/236-4000, $299.** Type enters the third dimension with this reasonably priced 3-D typographic effects and animation program. There's room for improvement, but it's an exciting tool for designers, multimedia producers, and those who enjoy working with type. **Nov 92**

DRAWING/ILLUSTRATION

Adobe Illustrator 3.01, Adobe Systems, 415/961-4400, $695. Adept transformation and reshaping capabilities and superb text-handling stand out in this object-oriented illustration program. It also includes features found in no other Mac draw program, such as tools to create line and bar graphs.

★★★ **Aldus FreeHand 3.1, Aldus Corp., 206/628-2320, $595.** A pressure-sensitive freehand tool is the most remarkable new feature of this updated drawing program. Substitution for missing fonts is another good addition, but skimpy text-editing tools and incomplete support for EPS continue to diminish its value. **Jun 92**

★★★ **CA-CricketDraw III 1.0, Computer Associates International, 408/432-1727, $249.** Although not revolutionary, this draw program boasts some original implementations, including dramatically improved gradations. **May 92**

Canvas 3.0 (3.0.6), Deneba Software, 305/596-5644, $399. Discovering the complex nuances of this draw program's immense feature list isn't easy, but it's well worth the effort. The precision-drawing functions in particular should appeal to many users.

★★★★ **IntelliDraw 1.0, Aldus Corp., 206/628-2320, $299.** Crowd-pleasing features such as physical and dynamic links make this automated draw program a great environment for planning and presenting, although it's less satisfying as a free-form drawing tool. **Nov 92**

MacDraw Pro 1.0v1 (1.5), Claris Corp., 408/727-8227, $399. The shallow array of integrated features in this draw program is perfect for the new or moderately experienced user, but compared with other programs in the same price range, it's slow and deficient.

EDUCATION/CHILDREN

★★★★ **A Silly Noisy House 1.0, The Voyager Company, 310/451-1383, $59.95.** A brightly colored animated world awaits exploration; CD ROM's simple scenes and syrupy songs are perfect for preschoolers. **May 92**

★★★ **American Discovery 3.0, Great Wave Software, 408/438-1990, $49.95.** Without glitzy graphics or sound, this educational game, intended mainly for classroom use, provides an excellent drill in geography, state capitals, and state facts. **May 92**

★★★ **The Castle of Dr. Brain 1.0, Sierra On-Line, 209/683-4468, $49.95.** After applying for a job as a lab assistant with the local mad scientist, you must use logic and raw brain power to navigate a series of rooms, mazes, and hallways on the way to your interview. Puzzles range from simple and mundane to creatively laborious. **Dec 92**

★★★ **The Complete Annotated Alice 1.0, The Voyager Company, 310/451-1383, $19.95.** *Alice in Wonderland* fans will love the "lost" out-of-print chapter in this HyperCard book designed primarily for PowerBook users. As literary hypertext hide-and-seek, it works. **Jun 92**

★★★ **Eco-Adventures in the Ocean, Eco-Adventures in the Rainforest 1.0, Chariot Software Group, 619/298-0202, $59.95.** Explore the ocean or rainforest while avoiding pitfalls and predators in these educational adventure games. Imaginary landscapes that combine features found in different environments may confuse some students. **Nov 92**

★★★ **Headline Harry and the Great Paper Race 1.0, Davidson & Associates, 310/793-0600, $59.95.** Travel through time and across the country as a journalist in this history/geography game. While not an educational masterpiece, it is lots of fun. **Dec 92**

★★★★★ **Just Grandma and Me, Brøderbund Software, 415/382-4400, $49.95.** Mercer Mayer's Little Critter comes to life in this charming, captivating, wondrously entertaining interactive storybook on CD ROM. **Aug 92**

Kid Pix 1.0 (2.0), Brøderbund Software, 415/382-4400, $59.95. An entrancing, enchanting color paint program aimed at children but delightful for grown-ups, too. Hilarious sounds, hidden surprises, spectacular effects, zany and creative tools—it's a classic.

★★★ **Kid Pix Companion, Brøderbund Software, 415/382-4400, $39.95.** Addition to Kid Pix adds clever new features, including the world's easiest to use QuickTime movie and presentation modules, but it's less appealing than the delightfully simple original. **Oct 92**

★★★ **MacGlobe 1.3.0, Brøderbund Software, 415/382-4400, $59.95.** Besides maps and bits of fun, such as national anthems, this geography software offers an impressive quantity of demographic and economic information. While it could stand some improvement in data export, it provides a fascinating intellectual adventure for home and school use. **Feb 93**

★★ **Math Shop, Math Shop Jr., Advanced Math Shop 1.0, Scholastic, 800/541-5513, $24.95.** The normal workbook format is converted into humdrum bits and bytes with these mathematics education games. **May 92**

★★ **NihongoWare, Vol. 1, Qualitas Trading Company, 510/848-8080, $623.** Although this Japanese-language CD ROM offers solid instruction, it's so expensive and so limited in its word selection, that it's not an economical choice for individual users. **Jan 93**

★★★★ **Number Munchers 1.1 (1.2), MECC, 612/569-1500, $29.95 to $69.** Fun, educational game builds arithmetic skills through arcade action. Munchers gobble your choice of multiples, factors, primes, equalities, and inequalities, but the game can't accept custom data sets. **Jun 92**

★★ **Picture It 1.0 (1.4), Penton Overseas, 619/431-0060, $69.95.** If you add custom word lists, this interactive French-English picture dictionary may serve as a decent aid to a more complete curriculum, but it's buggy and of uneven quality. **Aug 92**

★★★★ **Spelunx and the Caves of Mr. Seudo, Brøderbund Software, 415/382-4400, $49.95.** Unanticipated giggles, rich graphics, entertaining sounds, and creative learning activities fill this interactive hyperworld. We recommend it, despite its tiny bugs. **Jul 92**

★★★ **StudyWare for the SAT 3.7N (4.0), Cliffs Notes, 402/423-5050, $49.95.** Four full SATs, a TSWE (Test of Standard Written English), and a series of drills are included with this inexpensive SAT-training program. It doesn't provide a lot of tutorial assistance, but may be appropriate for students who need a quick brushup. **Jun 92**

★★★★ **Super Munchers 1.0, MECC, 612/569-1500, $49.95 to $69.** From a kid's point of view, this educational arcade game offers long-lasting appeal. The player maneuvers a cartoon Muncher around a game board, gobbling up words that fit target rules, such as Romantic composers or European countries. **Jun 92**

★★★ **Time Treks 1.0, Earthquest, 415/321-5838, $59.95.** An eccentric archaeologist opens portals through time, and you must close them in this educational, HyperCard-based game. Slow response time and limited animation and color are somewhat disappointing, but overall it's a fun way to browse through history. **Sep 92**

★★★★ **Transparent Language 1.04M, Transparent Language, 603/465-2230, $139.** Without an iota of glitz or glamour (no sound, graphics, color, or buttons), this foreign-language reader is a superb tool for bolstering language skills through reading. **Oct 92**

★★★★ **Where in the World Is Carmen Sandiego? Deluxe Edition, Brøderbund Software, 415/382-4400, $79.95.** The V.I.L.E. Gang is at it again, stealing famous objects and fleeing to locations around the world. In this deluxe version of the well-known geography game, there are more crooks, more clues, and more countries to visit. **Oct 92**

★★★★ **Word Munchers 1.0 (1.2), MECC, 612/569-1500, $29.95 to $69.** Munch the words with matching vowel sounds in this educational game for grades 1 to 5+. Dazzling color graphics stand out, but the repetitive cartoon sequences get tiresome. **Jun 92**

★★★ **World Atlas 1.2, Software Toolworks, 415/883-3000, $79.95.** Extensive, detailed maps of countries and regions are the highlight of this atlas software. In addition, descriptive headings report interesting text-based demographic data. **Apr 92**

GAMES

★★★ **4-D Boxing 1.0, Electronic Arts, 415/571-7171, $49.95.** Authentic motion and multiple viewing angles are the best features of this entertaining boxing game, but off-disk copy protection, geometric figures, and the inability to save games in progress make it less enticing. **Sep 92**

★★★ **The Battle of Britain, Deadly, 215/295-2284, $54.95.** It's August 10, 1940. The badly outnumbered British must defend their country against the invading Luftwaffe, and you're in charge. Although the graphics and sound are not spectacular, this is an entertaining, thinking person's game. **Dec 92**

★★★ **Blade1.1, LeviathanCorp., 313/826-3560, $99.95.** Surreal graphics in this fantasy martial-arts game are spectacular—a cross between Dali and Seuss—but the arcade action is extremely difficult to master. **Sep 92**

★★★ **Capitalist Pig 1.0 (1.02), Pluma Software, 602/969-9441, $59.95.** Terrorist attacks, embezzlement, fires—keeping a cool head is half the challenge if you are to become successful in this business simulation game. No clear end point means that getting rich, retiring, and writing novels is not an option. **Sep 92**

★★ **Creepy Castle 1.0, Reactor, 312/573-0800, $49.95.** Wolfman, the Bride of Frankenstein, and other ghouls from classic horror movies populate this clever arcade-style game. Still, delightful movie trivia doesn't compensate for frustrating performance delays and limited scenarios. **Jun 92**

★★★ **Cyberblast 2.01, Innerprise Software, 410/560-2434, $49.95.** Aliens have overrun the 64 levels of Fastrax Labs, and it's your job to get rid of them in this arcade game. While it's not the most unusual game in the universe, it's a nice, basic shoot-'em-up, with clever execution and appealing graphics. **Sep 92**

★★★★ **Go Master 5, Toyogo, 808/396-5526, $69.** Go has been called the most interesting board game yet invented. This excellent software version incorporates helpful learning aids and sample games. **Dec 92**

★★★★ **HardBall II, Accolade, 408/985-1700, $54.95.** From the pitcher's windup to the batter's swing, this baseball game comes astonishingly close to natural human motion. The upgrade adds more teams, more stadiums, instant replay, and the ability to create your own league. **May 92**

★★★ **Nobunaga's Ambition 1.0, Koei Corp., 415/348-0200, $59.95.** Visit the Warring States period of feudal Japan, unify the country, and usher in an era of peace. Strategy game is absorbing and challenging, but the interface can be annoying. **Jun 92**

★★★★ **Patton Strikes Back: The Battle of the Bulge, Brøderbund Software, 415/382-4400, $19.95.** Military simulation game with superior graphics is simple to learn and satisfyingly complex. If only they'd skipped the off-disk copy protection. **Jun 92**

★★★★ **Prince of Persia, Brøderbund Software, 415/382-4400, $49.95.** A high tolerance for frustration is necessary to negotiate the 12 mazelike levels of dungeon and palace in this arcade adventure, but amazingly realistic (altogether gory) animation, stunning graphics, and entertaining challenges make it all worthwhile. **Sep 92**

★★★ **Red Baron 1.0, Dynamix, 800/326-6654, $69.95.** The romance of history and the realism of a flight

continues

MACWORLD

Star Ratings

simulator combine in this World War I flight game. Despite small annoyances, including too many dialog boxes to get to the simulation, this game will charm any aspiring ace. Nov 92

★★★★ **The Secret of Monkey Island 1.0, LucasArts, 415/721-3300, $59.95.** A genuinely amusing, interactive tale of swashbuckling and daring deeds using splendid 256-color graphics and an original sound track. Low screen resolution and irksome copy protection only slightly spoil the delight. Sep 92

★★★★ **Shanghai II: The Dragon's Eye, Activision, 310/207-4500, $49.95.** Classic tile game is more addictive than ever; flashy enhancements include new tiles and layouts, as well as an entirely new game that's a variation on the tile-removal theme. May 92

★★ **Sherlock Holmes, Consulting Detective 1.0, Icom Simulations, 708/520-4440, $69.95.** Accompany Sherlock Holmes and Watson as they investigate three CD ROM–based mysteries. Primarily made up of video scenes, this game's only slightly more interactive than TV, and the picture's not as good. Aug 92

★★★★ **SimAnt 1.0, Maxis, 510/254-9700, $59.95.** Marauding red ants, ant lions, spiders, even power mowers—an ant's life is likely to be short in this remarkably detailed simulation game in which the object is to have black ants amass territory in a suburban backyard. Apr 92

★★★ **SimLife, Maxis, 510/254-9700, $69.95.** A megalomaniac's dream come true, this amazingly intricate simulation game allows players to create and control ecosystems. It's not easy, but the reward is an increased understanding of the complex interrelationships of life. Feb 93

★★★★ **Spaceward Ho 2.0.1, Delta Tao Software, 408/730-9336, $59.** A happy planet is a profitable planet in this absorbing, humorous strategy game of interstellar capitalism and imperialism. Aug 92

★★★★ **Spectre 1.0, Velocity Development Corp., 415/776-8000, $59.95.** Fight enemy tanks in a 3-D arcade game that is at once basic and extremely addictive. When installed on a network, it's one of the great antiproductivity tools of all time. May 92

★★★★ **Super Tetris, Spectrum HoloByte, 510/522-3584, $49.95.** Teensy tiles are a very minor negative in this exceptional tile game that's more varied, more challenging, and more forgiving than the original. Oct 92

★★ **Surgeon 3, The Brain 1.0 (1.1), ISM, 410/560-0973, $59.95.** Surgical-simulation game with realistic graphics and sound can be entertaining and educational, but it's overly intolerant of mistakes—not for the faint of heart or the easily frustrated. Sep 92

★★★ **Warlords, Strategic Studies Group, 904/494-9373, $59.95.** A medieval fantasy world is the setting for this colorful game of strategy and conquest with beautiful graphics. Unfortunately, the computer opponents are not challenging enough for an experienced war-gamer, although human opponents may be. Dec 92

★★★★ **Wordtris, Spectrum HoloByte, 510/522-3584, $49.95.** Tetris's falling blocks are letters in an arcade game for Scrabble lovers. Lots of variations, including modes for children, tournaments, and head-to-head play on a network, make it a super game. Jun 92

IMAGE EDITING/PAINT

Adobe Photoshop 2.0.1 (2.0.1), Adobe Systems, 415/961-4400, $895. With complete mastery of the bitmapped, continuous-tone environment, this product is the industry standard for image manipulation. Although it's not perfect, it's so good that if you make your living in graphic art, it's worth the price of a Mac itself.

★★ **Aldus Gallery Effects 1.0 (1.5), Aldus Corp., 206/628-2320, $199.** Uninspiring collection of 16 image-editing filters has an unusually strong manual. Apr 92

★★★ **Cachet 1.0, Electronics for Imaging, 415/742-3400, $595.** The tools, interface, output, and documentation of this color-image editor are all quite impressive for a first version, but serious failings include slow speed and disappointing sharpening. Dec 92

★★★ **Color It 1.0 (2.0), MicroFrontier, 515/270-8109, $119.95.** A magic-wand tool and antialiased brushes and text are among the high-end features found in this low-end color paint program. Occasionally mystifying and buggy, it's still a remarkable bargain. Apr 92

★★★★ **Expert Color Paint 1.0, Expert Software, 305/444-0080, $49.95.** A wonderful value for novices, this color paint program offers a tidy collection of features for an astonishingly low price. Beware of low memory settings, though, or it gets buggy. Jun 92

★★★★ **Fractal Design Painter 1.2, Fractal Design Corp., 408/688-8800, $349.** An expanded collection of paper textures and four new watercolor brushes add appeal to an already strong set of painting tools. Minor complaints include unsophisticated gradation and fill capabilities and an insensitive Undo command. Aug 92

MacPaint 2.0, Claris Corp., 408/727-8227, $125. Easy-to-use black-and-white paint program takes up very little RAM, but it adds few capabilities beyond those it offered eight years ago.

★★★ **ScanMatch 1.01 (1.02), Savitar, 415/243-3030, $199.** Basically half a color-calibration system. Software quickly and easily adjusts color scan files for screen display, with somewhat uneven results; those wishing to adjust images for print purposes need to use another application. May 92

★★★★ **Sketcher, Fractal Design, 408/688-8800, $149.** A variety of effects reproduce the styles and techniques of traditional drawing tools with this wonderful gray-scale paint and image processing program. Feb 93

★★★★ **Smoothie 1.02, Peirce Software, 408/244-6554, $149.** Create smoother screen images with this handy utility that antialiases the edges of on-screen artwork. Although it can't accommodate sound or accept imported QuickTime, it's a must for anyone who uses a Mac for presentations. Nov 92

★★ **Zeus 0.91 (0.92), Delta Tao Software, 408/730-9336, $499.** Color paint program tries hard to match capabilities found in more expensive programs, not always successfully. It's brimming with good ideas that are poorly implemented. Aug 92

MATHEMATICS/STATISTICS

Data Desk 3.0, Data Description, 607/257-1000, $595. Users with limited formal backgrounds in statistics can perform better analyses with this statistics program than with others.

★★★★ **HiQ 1.0 (1.1), Bimillennium Corp., 408/866-2010, $695.** A script language, which exhibits an endearing nonchalance about data structures and typing of variables, is only one of the impressive features of this formidable numerical mathematics software. Oct 92

JMP 2.0 (2.05), SAS Institute, 919/677-8000, $695. You get lots of value for your money with this statistical-analysis program and its vast assortment of functions, including strong classical statistics and visualizations, 3-D spin features, quality-control statistics, and a manual that is a model of concise clarity.

★★★★ **Maple V, Brooks/Cole Publishing, 800/354-9706, $450.** For functional scope and ease of use on a basic Mac (such as a Classic or Plus), this symbolic math software has no competitors. May 92

Mathematica 2.0 (2.1), Wolfram Research, 217/398-0700, $595. While its memory demands are high, this symbolic-math program offers a truly vast array of functions, including over 800 numerical and symbolic routines. The quality and quantity of its support literature are outstanding.

★★★ **Minitab 8.2, Minitab, 814/238-3280, $695.** These statistical-analysis tools are broad but not exhaustive. Still, they're easy to learn and easy to use, making Minitab an excellent teaching tool. The graphics and output are unfortunately typewriter-like. Jun 92

★★★ **Simulink 1.2, The MathWorks, 508/653-1415, $3995.** If you hear the word *Bode-plot* several times a week at work, this math-simulation software is designed to make your life wonderful. Little glitches and a command-line orientation are drawbacks. Dec 92

★★★ **StatView 4.0, Abacus Concepts, 510/540-1949, $595.** A nice mix of statistical prowess and operating convenience distinguish this statistical-analysis and presentation software. The printing options are outstanding. Nov 92

★★★★ **TeMath 1.0, Brooks/Cole Publishing, 800/354-9706, $39.95.** For roughly the price of a textbook, this mathematical-exploration software provides all the help a student needs to understand what's really happening in differential and integral calculus. Apr 92

MISCELLANEOUS SOFTWARE

★★★ **Aspects 1.01 (1.03), Group Technologies, 703/528-1555, $285 to $1295.** Collaborative software allows up to 16 people to edit a project. Controlled access as well as individual and linked views are good features, but the lack of outlining and spreadsheet modules limit its usefulness. Jun 92

★★★ **Audioshop 1.0 (1.03), Opcode Systems, 415/856-3333, $89.95.** Audiophiles will get a kick out of applying sound effects to any sound file on their Macs. You can also control the order of songs or sounds on an audio CD played on a CD ROM player. A number of quirks may confuse new users. Sep 92

★★★ **Bar Code Pro 1.0, Synex, 718/499-6293, $450.** Easy-to-use desk accessory creates bar codes in EPS or PICT for use in desktop publishing or labeling programs. It does well what it sets out to do, but lacks automatic sequential coding and fails to catch invalid characters. Sep 92

★★★★ **CameraMan 1.0 (1.1), Vision Software International, 408/748-8411, $149.** If you need to record continuous screen operations, this screen recorder is the best deal around. It handles 32-bit QuickDraw, takes advantage of QuickTime's long list of compression and playback capabilities, and even uses custom frame sizes. Sep 92

★★★ **Cross Country 1.0 (2.0), T-34 Microsystems, 904/396-2785, $179.95.** No unnecessary

frills complicate this efficient, inexpensive instrument-flight trainer. It doesn't have a true aerodynamic feel, but the flaw's not critical. **Jul 92**

GreatWorks 2.0, Symantec, 408/253-9600, $299. High marks to this integrated program for including an outlining module and a color paint module. While the integration may not be ideal, it's a solid program, worth a close look.

★★★ **IdeaFisher 2.0, Fisher Idea Systems, 714/474-8111, $595.** Inspiration never comes easily, but this creativity tool with a question bank of 6000 questions and an idea bank of 61,000 words and 700,000 links might help get the juices flowing. **Jan 93**

★★★★ **Insanity 1.0, UV Wave, 318/868-9944, $28.95.** Shoot your Mac with this cool control panel device that offers a choice of nine weapons, ranging from an Uzi to a pigeon. It has first-rate sound effects and detailed animation, but the novelty wears off. **Feb 93**

★★ **LinksWare 1.4 (2.0), LinksWare Corp., 408/372-4155, $189.** Although creating hypertext links between documents stored in nearly any format is relatively simple using this utility, the navigational assistance may be insufficient for complex projects. **Aug 92**

★★★ **Microsoft Works 3.0, Microsoft, 206/882-8088, $295.** Capable but unspectacular upgrade delivers marginally improved functionality and a welcome face-lift to this integrated program, but there are a number of incompatabilities, odd design choices, and performance flaws. **Feb 93**

★★ **Notify 1.0, Ex Machina, 718/965-0309, $149.** Innovative wireless transmitter uses Mac to send messages to pager. It's a start on a new technology, but the quirky product has a long way to go. **Jun 92**

★★★ **Personal Font, Signature Software, 408/458-0241, $179.95.** Turn your handwriting into a PostScript Level 3 or a TrueType font. The results are good, although not perfect—TrueType letters were not connected on screen, but this should be corrected with TrueType 2.0. **Dec 92**

★★★★ **Poetry in Motion, The Voyager Company, 310/451-1383, $29.95.** Performance videos of contemporary poets are juxtaposed with the texts of their poems and taped interviews in this intriguing CD ROM that combines the excitement of the stage with the reflective appeal of the page. **Feb 93**

★★★ **RateFinder 1.5 (1.6), Elefunt Software, 510/843-7725, $99.** Numerous interface violations don't change the fact that these all-inclusive shipping-rate tables make the old-fashioned chore of checking mail rates easier and more efficient. **Jun 92**

★★★★ **So I've Heard, Volume 1: Bach and Before, The Voyager Company, 310/451-1383, $24.95.** Engaging text by classical-music critic and lecturer Alan Rich describes nearly two millennia of western music (up to the mid-eighteenth century) in this CD ROM. It offers a unique and affordable opportunity to sample 50 or so performances, styles, and compositions. **Feb 93**

★★★ **SpeedyCD 1.2.2 (1.2.4), ShirtPocket Software, 602/966-7667, $70.** Get Info gets faster with this CD ROM–access accelerator that creates a database of files from a CD on your hard drive. If you regularly browse through the same CD ROM folders, this product might save you enough time for it to be worth the $70. **Nov 92**

★★★ **TypeReader 1.0, ExperVision, 408/428-9988, $695.** Speed and accuracy combine with a straightforward operating style in this high-end optical character recognition software that doesn't do everything its competition does, but is a major contender nonetheless. **Feb 93**

★★★★ **UpDiff 1.0, KyZen Corp., 609/354-3863, $169.** Innovative program compares two versions of a file, extracts the differences, and creates a difference file that is typically smaller than the original and can be used to update the older file. **Dec 92**

★★★ **WordScan, WordScan Plus 1.0 (1.01), Calera Recognition Systems, 408/720-8300, $295, $595.** The idiosyncratic interface of these two OCR programs is only a minor inconvenience considering their relative accuracy and speed. **Jun 92**

★★★★ **ZP4 7 (10), Semaphore Corp., 408/688-9200, $125.** Clean up and standardize addresses with this CD ROM, thereby reducing postage costs and avoiding undeliverable mail; uses a licensed version of the U.S. Postal Service's official database of every valid postal address in America. **May 92**

MULTIMEDIA

★★★★ **Adobe Premiere 2.0, Adobe Systems, 415/961-4400, $495.** A dream command post for video professionals, this QuickTime video-editing software produces stunning special effects with little effort. Only the program's appetite for memory, disk space, and computer horsepower prevent it from being the nonprofessional's dream as well. **Jan 93**

★★★ **Cinemation 1.0, Vividus Corp., 415/494-2111, $495.** Easy-to-use program merges animation, interactivity, and presentation features, but the image- and text-handling capabilities are less than stellar. **Jul 92**

★★★ **DiVA VideoShop 1.0, DiVA Corp., 617/491-4147, $599.** Instantaneous playback sets this graceful QuickTime editing software apart. Its simple beauty is slightly offset by a few rough edges, a lousy manual, and an occasionally clumsy interface. **Jul 92**

HyperCard 2.1, Claris Corp., 408/727-8227, $199. Ease of use has made this multimedia-authoring software a tool for the masses. Although color is awkwardly implemented, more add-on products have been developed for this than for any other multimedia program.

★★★ **MacroMind Director 3.1, Macromedia, 415/252-2000, $1195.** This minor update to a powerful and versatile multimedia authoring tool adds 23 scripting commands, QuickTime importing and editing, and a utility that compiles movies into a faster playback format—but the whopping $149 addition to the price makes it an upgrade most users can afford to miss. **Feb 93**

★★★ **Magic 1.0 (1.1), Macromedia, 415/252-2000, $395.** Outstanding editing features make this multimedia-presentation software easy to master. Many of the features of more-complex programs are missing, but what it does, it does well. **Aug 92**

★★★ **Morph 1.0, Gryphon Software Corp., 619/454-6836, $149.** With patience and practice, you can become a high-tech special-effects wizard using this movie utility that "melts" one image into another. While using it is simplicity itself, you can only morph still images, and the program suffers from some first-release glitches. **Nov 92**

NETWORKING/CONNECTIVITY

★★★ **A/UX 3.0, Apple Computer, 408/996-1010, $709.** Hybrid–operating-system package implements the Stone Age, type-one-line-at-a-time text interface of Unix in a way a Macintosh user might actually like. **Nov 92**

★★★★ **AccessPC 2.0, Insignia Solutions, 415/694-7600, $99.95.** Slick control over formatting multiple types of DOS media is the major advantage of this file-transfer utility. **Oct 92**

★★★ **Carbon Copy for the Mac 2.0 (2.04), Microcom, 919/490-1277, $99 or $299.** Screen-sharing utility is convenient and economical for occasional use but because it competes for RAM on attended low-memory Macs, it isn't efficient enough to use as a global solution for remote-control support. **Apr 92**

★★★ **CompuServe Information Manager 2.0.1, CompuServe, 614/457-8600, $49.95.** The goal of this product is to give friendlier information-access to CompuServe for Macintosh users. An appealing color interface and increased speed are signs of success, but there's still room for improvement. **Dec 92**

★★★ **DataClub Classic, DataClub Elite 2.0, Novell, 800/638-9273, $175, $1395.** Fully distributed file servers allow users to pool the free space on their drives into one virtual server. File sharing is transparent, but when a participating Mac disconnects from the network, users lose access to files stored on its hard drive. **Aug 92**

★★★★ **DOS Mounter 3.0, Dayna Communications, 801/531-0600, $89.95.** If you need to use wild cards in extension mapping, this file-transfer utility is the only option, although it's slower than other file-transfer programs. **Oct 92**

★★★ **Macintosh PC Exchange 1.01, Apple Computer, 408/996-1010, $79.** For basic file transfer, this control panel device allowing cross-platform file sharing is fine, but it's hardly state-of-the-art. **Oct 92**

★★★ **MicroPhone II 4.0 (4.0.2), Software Ventures Corp., 510/644-3232, $295.** Refinements are evident throughout this telecommunications software's upgrade, but not everyone needs $295 worth of sophistication. The impressive scripting facility is countered by poor help features. **Jul 92**

★★★ **NetMounter 1.00 (1.01), Dayna Communications, 801/531-0600, $99.** Reasonably priced utility provides Macs access to Netware file servers without installing Netware for the Macintosh on the server. It's not an ideal choice, but it is economical for mixed networks with only a few Macs. **Sep 92**

★★★ **Network SuperVisor 2.0.1 (2.1), CSG Technologies, 412/471-7170, $495.** Fast and accurate data collection is the strong point of this network-management utility, but the interface isn't that intuitive. **Aug 92**

★★★★★ **NetWorks 1.0.1 (2.0), Caravelle Networks Corp., 613/596-2802, $1195.** Become a network demigod with omnipresent capabilities over network devices using this network-management and paging utility. *Macworld*'s network manager loved it, calling it versatile, flexible, and worth its weight in gold. **Jun 92**

★★★★ **PacerForum 1.0.1, Pacer Software, 619/454-0565, $549.** Any file server or underused networked Mac can host an online forum using this net-

continues

MACWORLD

Star Ratings

work bulletin board system. The well-designed graphical interface stands out, although the display looks better on color monitors. **Jul 92**

★★★★ **RouterCheck 2.0, Neon Software, 510/283-9771, $895.** Keep your finger on the pulse of your router configurations and internet traffic with this network-administration utility. It's a must for midsize or larger internets, but too pricey for small networks. **Oct 92**

SoftPC 2.0 (2.5), Insignia Solutions, 415/694-7600, $399. A graceful implementation of the PC architecture on a Mac, this program emulates PC AT hardware through a powerful BIOS that remaps Intel 80286 addresses to a Motorola 680X0. The main drawback is the slow speed.

★★★ **Status Mac 2.0.2 (3.0), On Technology, 617/876-0900, $449.** With less hassle for network managers and users, this upgrade invites customization in both the collecting and storing of information about networked Macs; users can even delay time-consuming profiling. **May 92**

★★★★ **TechWorks Net Utilities 1.0, Technology Works, 512/794-8533, $129.** Collection of five separate applications provides essential network-monitoring tools at a price that would please anyone. **Dec 92**

VersaTerm/Pro 3.1 (3.6.2), Synergy Software, 215/779-0522, $295. It's a great tool for working with VAXs or when you want Textronix-terminal emulation, but this communications software lacks the scripting many people use for working with BBSs or commercial information services.

★★ **Vicom Terminal Emulators (4.2), Vicom Technology, 604/684-9517, $195 to $3500.** These bare-bones, British-designed terminal emulators lack many common U.S. modem configurations, but do support multiple simultaneous sessions. **Aug 92**

WhiteKnight 11 (11.14), The FreeSoft Company, 412/846-2700, $139. In the right hands, this product is the precision tool of communications software, but it does assume familiarity with telecommunications and with programming concepts.

ORGANIZATION/PRODUCTIVITY

★★ **ACT 1.0, Contact Software International, 214/919-9500, $395.** While this contact manager has several laudable features, such as customizable contact views and an integrated word processor, learning how to use it is a frustrating experience. **Feb 93**

★★★ **Active Memory 2.0, ASD Software, 714/624-2594, $199.** Personal organizer distinguishes itself by providing strong network support, although it may be overkill for a lone user. **Aug 92**

Address Book Plus, PowerUp Software, 415/345-5900, $99.95. What you see is what you get with this field-based address-book software that sorts, selects, formats, and prints names and addresses in every conceivable way. The disadvantage is that the product is slow, especially with more than 200 addresses in a file.

★★★★ **Agent DA 2.0 (2.1.1), TeamBuilding Technologies, 514/278-3010, $129.** Simple, flexible calendar/reminder program includes every obvious calendar function—easy navigation, extensive print options, adjustable displays, recurring events, and even a straightforward manual. **Sep 92**

★★★ **Amaze Daily Planners: Cathy, The Far Side, Word-A-Day (2.0/1993), Amaze, 206/820-7007, $59.95.** A cartoon (or word) a day makes scheduling more fun with these icon-based calendar/daily planners, but the graphics take up a lot of hard drive space, and the programs must be running in order for alarms to sound. **Sep 92**

★★ **Connections 2.1, Concentrix Technology, 415/358-8600, $199.** A wider range of scheduling features, new printing options, and improved networking capabilities don't change the fact that this HyperCard-based personal information manager is just too slow. **Nov 92**

★★★★ **DateBook 1.5.1, After Hours Software, 818/780-2220, $125.** Personal time manager offers a flexible approach to event scheduling and to-do-list management. This upgrade adds new features and fixes bugs that plagued the first version. **Feb 93**

★★★ **DayMaker 1.01 (2.0), Pastel Development Corp., 212/941-7500, $99.95.** In spite of a few rough edges and missed opportunities, this personal organizer is a versatile tool for creating to-do lists, prioritizing tasks, and maintaining a calendar with alarms. **Apr 92**

Dynodex, Portfolio Systems, 408/252-0420, $89.95. Raw speed is the trade-off for an unappealing screen display with this field-based address-book software. It's fast enough in searhing, opening, and saving to be a worthwhile investment.

★★★ **EasyAlarms 2.0.3, Essential Software, 914/889-8365, $99.** Complex, flexible calendar, reminder, and to-do list program includes scripting and sound recording among many other features. **Nov 92**

★★★★ **First Things First 2.0 (3.0), Visionary Software, 503/246-6200, $69.95.** The nifty on-screen clock that floats serenely above your windows is the most appealing feature of this good but basic event-reminder utility. **Apr 92**

★★ **Hello, Atelier Systems, 415/285-1233, $99.** Unusual combination of contact management and word processing in a compact package. This first release is hampered by several notable flaws, such as text documents that must be linked to a contact name. **Jan 93**

★★★★ **In Control 1.0 (1.1), Attain Corp., 617/776-1110, $129.95.** Shrink an immense list down to a bare skeleton and expand it again using this to-do-list manager's clean interface and collapsible row-and-column format. **May 92**

★★★ **Nolo's Personal RecordKeeper 3.0, Nolo Press, 510/549-1976, $34.96.** Hierarchically configured database organizes your personal affairs, including legal matters, financial records, insurance plans, family history, and more, but it is frustratingly inflexible. **Jan 93**

★★★ **Now Up-to-Date 1.0.1, Now Software, 503/274-2800, $99.** The swift performance and logical structure of this network calendar program make it easy to use, but deficiencies, such as the lack of a to-do-list function, are frustrating. **Oct 92**

★★ **PowerTrax 1.1 (1.2), Soft Solutions, 404/457-9400, $495.** Convoluted and repetitive data entry processes slow you down when they should speed you up in this 4D-based information-management system. **Apr 92**

★★★ **TouchBase 2.0 (2.0.1), After Hours Software, 818/780-2220, $125.** Entering data is quick and easy, and there are lots of useful printing options, but this personal information manager displays a few rough edges, such as not allowing you to copy the information in the Record Summary field. **Aug 92**

PRESENTATION GRAPHICS

★★★★ **Action 1.0, Macromedia, 415/252-2000, $495.** Entry-level multimedia integration program offers, for its price, a rich selection of features, including an excellent variety of transitions as well as gradient and patterned backgrounds. It makes producing presentations with sound and motion surprisingly easy. **Feb 93**

Aldus Persuasion 2.1 (2.12), Aldus Corp., 206/622-5500, $495. For slide presentations, this product provides an all-in-one studio where each element—outline entries, slides, notes, handouts, and charts—is dynamically linked to the others. It offers layered builds and automated templates, and has a proven track record.

★★★★ **DeltaGraph Professional 2.01 (2.02), DeltaPoint, 408/648-4000, $295.** A smooth interface and outstanding technical support are only two of the stellar features in this graphing and charting program. This upgrade adds 13 new chart types and a number of presentation capabilities. **May 92**

★★★ **FlowChart Express 1.0, Kaetron Software Corp., 713/890-3434, $149.** Inexpensive, easy-to-use flowchart software readily meets the needs of most flowchart creators, although those with extensive requirements will still need a larger, more powerful feature set. **Jan 93**

★★★★ **GraphMaster 1.31a (1.33), Visual Business Systems, 404/956-0325, $295.** Excellent general-purpose charting and graphing program offers a number of unusual features, including pictographs and 360-degree free rotation. A frequent inability to undo actions is the only serious irritation. **May 92**

★★★★ **Microsoft PowerPoint 3.0, Microsoft, 206/882-8080, $495.** This remarkable upgrade puts this presentation program ahead of the pack in terms of convenience and ease of use. Although the ready-made template collection is pretty paltry, the extensive system of master layers, reliable cross-platform compatibility, and strong on-screen presentation capabilities more than compensate. **Feb 93**

★★ **PEMD Discovery 1.3.1, PEMD Education Group, 707/894-3668, $189.** Unsophisticated data-search and -retrieval routines, limited displays, and a weak manual restrict this graphical data-analyis software's usefulness. **Apr 92**

★★★ **SigmaPlot for the Macintosh 4.11, Jandel Scientific, 415/924-8640, $495.** It's a short path from raw data to publishable graphs with this scientific graphing software. The Mac fundamentals need polish, but the program offers unique analytic capabilities. **Jul 92**

PROGRAMMING

★★★ **EdScheme 3.4, Schemers, 305/776-7376, $49.95.** This clear, elegant programming language is an excellent tool for learning good programming techniques, although it can't be used to create stand-alone applications. **Nov 92**

★★★★ **Object Master 1.0.2, ACIUS, 408/252-4444, $395.** Successful combination of the superior object-management facilities typically found in Smalltalk as well as a first-rate programmer's editor. Plus it works with the most popular languages: C, C++, and Pascal. **Jan 93**

★★★★ **Prograph 2.5, TGS Systems, 902/455-4446, $495.** Elegantly designed, object-oriented development environment simplifies Macintosh programming. The

graphics-based program is conceptually more advanced than traditional object-oriented programming. **Jun 92**

★★★ **Serius Programmer 3.0, Serius Corp., 801/261-7900, $395.** The graphical interface of this application-design environment provides nonprogrammers with tools for creating custom software, but the documentation lacks critical explanations. **Jan 93**

★★★★ **Think C 5.0, Symantec Corp., 408/253-9600, $299.** Although not a radical improvement, this is a significant upgrade to an outstanding development tool. Beginners won't find the documentation helpful. **Jul 92**

★★★★★ **Think Pascal 4.0, Symantec Corp., 408/252-3570, $249.** A remarkable achievement—a programming language and environment full-bodied enough for professional programmers while still inviting for neophytes. No weak points and dozens of strengths. **Aug 92**

★★★★ **UserLand Frontier 1.0 (2.0), UserLand Software, 415/369-6600, $249.** A robust scripting language distinguishes this ground-breaking desktop programming tool that can automate desktop functions, repetitive data-managements tasks, and more. Scripts can only be used on computers with copies of the program. **Jul 92**

SCIENCE/ENGINEERING

★★★ **Caduceus Physics 1.0, Scientia, 617/776-3427, $159.95.** Giant HyperCard stack consists of carefully indexed cards covering small conceptual bites of physics; it's the first in a series of programs designed to prepare students for the Medical College Admissions Test (MCAT). **Jan 93**

★★★★ **Entrypaq 3.0, Albathion Software, 415/824-2737, $149.95.** Low-end expert-systems shell is an excellent teaching tool, but the slow performance and HyperCard interface rule it out for practical implementation. **Nov 92**

★★★ **Expert Astronomer 1.0, Expert Software, 305/444-0080, $49.95.** Draw maps of the sky from any location in the Solar System and learn about celestial objects with this astronomy software. Most effective in color, this is a great educational tool for beginners and a reference database for experts. **Dec 92**

★★★★ **Interactive Physics II 1.0 (1.01), Knowledge Revolution, 415/553-8153, $399.** Motion simulation software is an improvement over traditional classroom instruction in physics. This new version greatly expands the range of problems that can be solved, and adds support for QuickTime. **Dec 92**

★★★★ **MacBreadboard 1.1, Yoeric Software, 919/644-1620, $59.95.** Useful educational engineering software simulates with excruciating detail every aspect of a digital integrated-circuit breadboard trainer. It accurately replicates and even surpasses the behavior of a physical breadboard—without burning out IC chips. **Dec 92**

★★ **NueX 1.1 (1.3), Charles River Analytics, 617/491-3474, $295.** Lightweight introduction to artificial neural networks and knowledge-based expert systems has some merit, but cannot be considered a serious production tool. **Oct 92**

★★★★ **Sequencher 2.0, Gene Codes Corp., 313/769-7249, $2200.** While not implementing everything a DNA researcher could want, this software for manipulating DNA-sequence information does provide the things a researcher really needs. The single best feature is its raw speed. **Dec 92**

UTILITIES

After Dark 2.0, Berkeley Systems, 510/540-5536, $495. Turn your screen into an aquarium or a window into a night skyline with this whimsical screen saver that includes more than 30 different modules.

★★★ **ALSoft Power Utilities 1.0.1 (1.0.2), ALSoft, 713/353-4090, $129.95.** Buying this set of seven utilities is more economical than purchasing the included disk optimizer and resource manager (DiskExpress II and MasterJuggler) separately, but the other five utilities are unimpressive. **Aug 92**

★★★ **AutoDoubler 1.0.7 (2.0), Salient Software, 415/321-5375, $79.95.** Designed to operate transparently, this automatic file-compression utility is a practical solution for users short on disk space, but it's missing many of the features of dedicated file-compression utilities, and it provides only limited control over the process. **Sep 92**

★★★ **BetterWriters 1.0.1 (1.0.3), GDT Softworks, 604/291-9121, $69.** Smart drivers teach your ImageWriter, StyleWriter, or DeskWriter laser printer tricks, letting it perform printing gymnastics such as inverting images and adding a variety of options for improving output. Minor incompatibilities with some common applications are inconvenient. **Jul 92**

★★★★ **Citadel with Shredder 1.0 (1.1), Microcom, 919/490-1277, $149.95.** Simple, convenient set of system-security tools covers all the bases, including password protection, encryption, permanent erasure, and more. **Jun 92**

★★ **Crash Barrier 1.0.1 (1.1), Casady & Greene, 408/484-9228, $79.95.** Control panel device is supposed to intervene during system crashes. It's a great idea but it only works for certain types of crashes. **Apr 92**

DiskDoubler 3.7 (3.76), Salient Software, 415/321-5375, $79.95. With its impressive safety features, extremely tight compression, and respectable speed, this file-compression utility is a must-have for anyone who could use more hard drive space.

★★★ **DiskFit Pro 1.0 (1.1), Dantz Development Corp., 510/849-0293, $125.** Effective backup utility requires a time- and disk-consuming initial full backup, but subsequent incremental backups are simple and speedy. It does not support tape drives. **Apr 92**

★★★ **Drive 7 2.3, Casa Blanca Works, 415/461-2227, $79.95.** Universal hard drive updater and formatter has an attractive, uncluttered interface that's so easy to use it makes hard drive maintenance almost relaxing. **Jan 93**

★★★★ **easyPrint 1.0, SF/O, 402/291-0113, $29.95.** Nifty utility lets you switch printers without using the Chooser. It's a bargain for network users and those who frequently change output devices. **Oct 92**

Exposure Pro 1.0.2 (1.02), Baseline Publishing, 901/682-9676, $139.95. A floating palette in this screen-capture utility lets you edit your screen shots before you save them. It's a clever idea for those who don't own a paint program, but it only creates 72-dpi bitmaps.

★★★ **Fastback Plus 2.6 (3.0), Fifth Generation Systems, 504/291-7221, $189.** Even the most hardened shirker should be inspired to back up by the marvelously simple interface of this software. One warning—memory shortages can cause it to quit unexpectedly when running in the background. **Apr 92**

★★★★ **FolderBolt 1.02 (1.02c), Kent Marsh, 713/522-5625, $129.95.** Three designated levels of folder protection, plus flexible options for password-handling among other actions, are the assets of this utility. File encryption, however, is not included. **Jun 92**

★★ **Gofer 2.0, Microlytics, 716/248-9150, $79.95.** Poky processing time is the trade-off for flexible text-search options without indexing by this file-finding utility. Our reviewer vetoed the trade. **Jun 92**

★★★ **HAM 1.0, Microseeds Publishing, 203/435-4995, $79.95.** Apple-menu enhancer adds submenus; allows reordering; and includes a folder of recently opened items in your Apple menu. **Apr 92**

★★★ **Hard Disk ToolKit Personal Edition 1.1.2, FWB Software, 415/474-8055, $79.** The more arcane features of the heavy-duty Hard Disk ToolKit have been stripped out of this entry-level, non-power-user version, but everything you really need to format, update, partition, and manage your hard drive is still included. **Jan 93**

★★★★ **Kiwi Power Menus 1.0, Kiwi Software, 805/685-4031, $39.95.** Simple little utility adds flexibility to the Apple menu by adding an unlimited number of submenus and allowing you to change the font and size in the menus. **Dec 92**

★★★ **Kiwi Power Windows 1.5 (1.5.2), Kiwi Software, 805/685-4031, $79.95.** Our skeptical reviewer found this system extension surprisingly handy. Its hierarchical menu lists all the open windows in the Finder and any applications. **Jul 92**

★★★ **MacPalette II 2.2, Microspot USA, 408/253-2000, $69.** You can print images from 8-bit and 24-bit color programs when you use an ImageWriter II with a four-color ribbon and this new driver that approximates halftones by dithering. While the results are less than state-of-the-art, so is the cost. **Sep 92**

★★★★ **MacTools 2.0, Central Point Software, 503/690-8090, $149.** The consistent, 3-D–style interface makes it easy for the inexperienced user to navigate this utility package; the automated hard drive and floppy-disk repair capabilities and antivirus capabilities make it an asset for anyone. **Oct 92**

★★★★ **Magnet 1.0, No Hands Software, 415/321-7340, $129.95.** Automation aids the laborious task of file management with this software. It creates "agents" or "magnets" that trigger in response to user-specified events and automatically look for files and folders to copy, move, or alias. **Feb 93**

★★★★ **MasterFinder 1.2.1, Olduvai Corp., 305/670-1112, $149.** Ingenious finder utility provides rapid access to frequently used files and folders, permits operations on several files at once, and saves catalogs of offline volumes, but the many features require some effort to learn. **Nov 92**

★★★ **More Disk Space 1.1 (1.2), Alysis Software Corp., 415/566-2263, $39.95.** Automatically compress and expand files with this utility. Although it doesn't identify compressed files, and must run as a start-up application to work automatically, it does offer a measure of control that similar utilities lack. **Sep 92**

★★★ **NightWatch II 2.0.1b, Kent Marsh, 713/522-5625, $159.95.** Although skillful snoops can override the screen-locker feature of this hard drive security utility, the password protection provides a flexible and safe method of restricting access to anyone turning on your hard drive. **Nov 92**

continues

MACWORLD

Star Ratings

★★★★ **Nok Nok 1.0 (1.0.3), Trik, 617/933-8810, $49.95.** Plug the security holes that System 7 file sharing created, with this effective file-share monitoring utility that logs people's attempts to connect to your Mac; alerts you when someone does connect, and sets time limits for file-share users. Oct 92

★★★★ **Norton Utilities for Macintosh 2.0, Symantec Corp., 310/453-4600, $149.** Everything-including-the-kitchen-sink utility package does an excellent job of diagnosing and repairing damaged hard drives and floppy disks, but the interfaces of the various components differ wildly. Oct 92

Now Utilities 3.0.2 (4.0.1), Now Software, 503/274-2800, $149. Despite minor imperfections, this collection of utilities, including ten separate programs and a variety of sample and support files, provides lots of highly polished bang for your buck.

★★★ **On Location 2.0.1, On Technology, 617/876-0900, $129.95.** Fast file-finding utility with improved functionality shows formatted files, and updates index in background. Alas, the initial indexing is time-consuming, and the search functions are incomplete. Jun 92

★★★ **Retrieve It 1.0, MVP Software, 415/599-2704, $129.** It's great that this nonindexed file-finding utility allows you to search by file name as well as by text, but it is definitely slower than indexed searching. Nov 92

★★★★ **Shredder 1.0.1, DLM Software, 619/453-4984, $69.** Permanently blitz your data with this quick and easy trash-management tool that writes over deleted data—in accordance with Department of Defense specifications—so that file-restoration programs can't bring it back. Jul 92

★★★ **Silverlining 5.4, La Cie, 800/999-3919, $149.** Extensive and detailed testing is only one of many advanced functions offered by this hard drive–management utility. The interface is lackluster and apt to confuse beginners. Jan 93

★★★★ **SnapBack 1.0, Golden Triangle Computers, 619/279-2100, $129.** For regular day-to-day backups, this network backup software is a great choice. Its strength lies in its simplicity and its easy-to-use, one-window interface, but it requires a dedicated hard drive. Dec 92

★★ **SuperDuper 1.7, NeoConcepts, 408/899-4821, $79.** If you're sick of duplicating disks with the Finder, this utility is an acceptable alternative, but there are other utilities that are better, cheaper, and do the same thing. Nov 92

Symantec Antivirus for the Mac (SAM) (3.0.9), Symantec, 408/253-9600, $99. No-holds-barred virus fighter monitors your Mac and alerts you when it sees suspicious activity. Advanced users and network managers will appreciate its customization features and extensive scanning options.

★★★★ **TimeLog 1.01 (1.02), Coral Research, 702/588-9690, $97.** Even jaded computer users will approve of the reporting options offered by this utility for recording program-usage information. No network features included. Jul 92

★★★ **Voice Navigator SW 2.3, Articulate Systems, 617/935-5656, $399.** Talk back to your Mac (if it has built-in sound input) with this speech-recognition software. Defining macros that respond to voice commands can be frustrating, but the product is a real boon for disabled users. Jan 93

★★★★ **Wallpaper 1.0.1 (1.0.2), Thought I Could, 212/673-9724, $59.99.** Terrific control panel device lets you design, edit, import, and display repeating patterns on your Mac's desktop. Comes with fun, creative predesigned patterns. May 92

★★★ **WindoWatch 1.52 (1.53), ASD Software, 714/624-2594, $149.** If your main concern is to track program and file use, this utility will handle the job nicely. Using it for time billing with numerous programs, however, may be a maintenance nightmare. Jul 92

★★★ **WonderPrint 1.0, Delta Tao Software, 408/730-9336, $59.** StyleWriters and DeskWriters produce halftones good enough for newsletters with this printing extension that improves the output of QuickDraw printers and accelerates printing of pictures on PostScript printers. Jan 93

★★ **Workspace 1.0, Ark Interface, 206/654-4127, $149.** Although this novel desktop replacement is an intriguing first step toward improving the Finder, not enough functionality was added to satisfy our reviewer. Jul 92

★★★ **Zephyr Palettes for PageMaker, FreeHand 1.0.2 (1.3), Zephyr Design, 206/324-0292, $79.95.** Exchange pull-down menus for palettes in PageMaker or FreeHand with these cleverly conceived, modestly priced utilities. A number of details could still be smoothed, but none are real stumbling blocks. Jul 92

VERTICAL MARKETS

★★ **ConstructionMac 1.2 (2.0), Revelar Software, 801/485-3291, $99.** With a lot of work from you, this software will organize your construction or remodeling project. Oct 92

★★ **The Desktop Lawyer, The Open University, 407/649-8488, $99.95.** The manual included with this collection of more than 300 legal-document templates provides an excellent overview of legal concepts; too bad the directions for filling out the forms are so unclear. Apr 92

★★★★ **Diet Balancer 1.0, Nutridata Software Corp., 914/298-1308, $69.95.** Easy-to-use personalized weight-planning tool includes a database of nutritional values and standard serving sizes, and is useful for home diet-planning. Dec 92

★★★★ **Grade Machine 5.0, Misty City Software, 206/828-3107, $79.** Teachers' lives get easier with this software that quickly sets up a useful electronic grade book. Program includes networking capabilities plus dozens of options for printing reports. Dec 92

★★★ **JobTracker 2.02, InfoSolutions, 814/355-2983, $395 to $844.** Designed specifically for publication management, this scheduling and project-management software isn't completely polished, but it manages the job competently. Dec 92

★★★ **Legal LetterWorks 1.0, Round Lake Publishing, 203/438-1048, $79.95.** Any word processor can open the 165 legal-document templates included in this collection, and the modular form design is relatively versatile. Apr 92

★★★ **Making the Grade 2.0, Jay Klein Productions, 719/591-9815, $99.95.** The Macintosh version of the Apple II program, Grade Busters 1/2/3, this grade-book software with dozens of reporting options is easy to learn, but if you're already spreadsheet-literate, the friendly dialog boxes and reminders may get in the way. Dec 92

★★★★ **Nolo's Living Trust 1.0, Nolo Press, 510/549-1976, $79.95.** Gracefully guiding users through the process of drafting a trust, this product is carefully thought out and a great value for simple trusts. Aug 92

★★★ **Nutri-Calc Plus 1.2, Camde Corp., 602/926-2632, $225.** Designed for knowledgeable and serious users, this powerful, flexible program manages nutrition information and analyzes diets. Dec 92

★★★ **Stat-Ref 3.2a, Teton Data Systems, 307/733-9258, $95.** Medical database on CD ROM lets you search by keyword. Because it provides access to limited sets of journal citations, it's not suitable for research, but it could effectively replace a small reference library in an office. Jan 93

WORD PROCESSORS

★★★ **LetterPerfect for Macintosh 2.1, WordPerfect Corp., 801/225-5000, $149.** Stripped-down version of WordPerfect measures up as a serviceable low-end word processor, with clean, accurate documentation and an uncluttered interface. Jan 93

★★★★ **Microsoft Word 5.0, Microsoft, 206/882-8080, $495.** New features, including drag-and-drop editing, along with an enhanced set of familiar features, add up to a word processor that is kinder and gentler—as well as bigger and slower. Apr 92

★★ **Nisus Compact 3.3 (3.31), Nisus Software, 619/481-1477, $150.** Inexpensive price and low disk-space requirements don't compensate for this word processor's many missing features, including mail merge, macros, and word count. Memory quirks are an additional problem. Aug 92

★★ **Taste 1.02 (1.02c), DeltaPoint, 408/648-4000, $149.** The page-view, WYSIWYG orientation of this word processor with page-layout features makes it considerably slower than text-oriented word processors. Redraw and translator bugs are other problems. May 92

★★★ **WordPerfect for Macintosh 2.1 (2.1.2), WordPerfect Corp., 801/225-5000, $495.** Play QuickTime movies in your text files or publish and subscribe with this upgrade. It continues to provide the best desktop publishing and graphics capabilities of any word processor, but it lacks glossary- and table-creation features. Jun 92

★★★★ **WriteNow 3.0, T/Maker Company, 415/962-0195, $249.** The streamlined approach of this low-end word processor will appeal to many Macintosh users, especially the storage-conscious. A nice mix of features includes impressive implementation of style sheets. Sep 92

WRITING TOOLS

★★ **Correct Grammar 3.0 (3.01), Wordstar International, 415/382-8000, $99.** Illogical and inappropriate recommendations are a hallmark of all grammar checkers, but this one also violates Mac conventions in irritating ways. Aug 92

★★★ **Correct Letters 1.1 (1.0), Wordstar International, 415/382-8000, $49.** In addition to more than 250 ready-made business letters, this HyperCard-based product boasts an excellent online Guide to Letter Writing. The disabled Find command is mystify-

ing and inconvenient. **Jul 92**

★★ **Correct Writing 2.0, Wordstar International, 415/382-8000, $49.** For those who are unsure of the elements of style, this online reference is convenient and comparatively inexpensive, but it is far from complete. **Sep 92**

★★★ **DocuComp II 1.0 (1.03), Advanced Software, 408/733-0745, $179.95.** Document-management utility compares text in two versions of the same file and reports the differences in a comprehensive, easy-to-follow format. **Nov 92**

★★★★ **EndNote Plus 1.2 (1.2.1), Niles and Associates, 510/649-8176, $249.** Reference database and tool for creating citations and bibliographies is now accessible from within Microsoft Word 5.0, representing a significant enhancement to this excellent product. **Sep 92**

★★★ **Plots Unlimited 1.04, Ashleywilde, 310/456-1277, $399.** Peter loves Allison but she has a breakdown when he confesses to murder. Or maybe not. This writing tool's database contains 5600 plot twists, all linked. The interface is imperfect, leaving items in bold when they should be grayed out, and it requires too much mousing. **Jul 92**

★★★★ **Pro-Cite 2.0, Personal Bibliographic Software, 313/996-1580, $395.** Valuable bibliographic database program generates large, complex bibliographies. Some features aren't easy to use, but it does have 20 predefined and 6 user-defined forms, plus flexible sorting options. **Jun 92**

★ **StoryLine 1.02 (1.4), Truby's Writers Studio, 310/575-3050, $345.** Frustrating and sometimes haphazard HyperCard-based program attempts to offer expert training in the craft of plot development. **Aug 92**

★★★ **Thunder 7 1.0.5 (1.5), Baseline Publishing, 901/682-9676, $99.95.** The speed, customizing options, and overall feature-set of this stand-alone spelling checker and thesaurus are admirable, but before you can trust it implicitly, it needs a dictionary with greater integrity. **Jul 92**

INPUT DEVICES

★★★ **A3 Mouse, Mouse Systems Corp., 510/656-1117, $134.95.** A smooth ride and tight resolution characterize this optical device with three light-touch keys. Stronger software would have made it a more attractive package; the software's incompatibilities and limitations are a problem. **Jun 92**

★★★ **Acecat for Macintosh, AceCAD, 408/655-1900, $149.** It's the hands-down winner in the digitizing-tablet price competition, but although this product works well, it lacks some of the amenities of higher-end tablets. **Aug 92**

★★★ **DrawingBoard II, Drawing Pad, CalComp, 800/932-1212, $645, $395.** Two likable features of these digitizing tablets are the transparent, hinged cover for securing artwork, and a menu strip with buttons for changing drawing modes and accessing macros. Stylus problems and CalComp's haphazard tech support are drawbacks. **Jul 92**

★★★ **Mouse-Trak, Itac Systems, 214/494-3073, $179.** Well-positioned, easy-to-rotate trackball with a soft wrist-pad is comfortable to use, but must be disassembled to reconfigure the buttons. **Nov 92**

★★★ **MouseMan, Logitech, 510/795-8500, $129.** Bear-paw–shape mouse with three programmable buttons is handsome and solidly made. It may be too big for some hands. **Jun 92**

★★★★ **The Bat, Infogrip, 504/766-8082, $495.** Right- and left-hand keypads slant the little fingers down and the thumbs up, with built-in wrist rests. Our reviewer considered it the best ergonomic device she'd seen; the downside is learning to type all over again. **Oct 92**

★★★ **TrackMan, Logitech, 510/795-8500, $149.** There's a right-hand bias to this trackball with three programmable buttons and a handy click-lock feature. **Jun 92**

★★★★ **Turbo Mouse 4.0, Kensington Microware, 415/572-2700, $169.95.** The large buttons on either side of this trackball provide just the right measure of tactile feedback while the removable ball glides freely. The breakthrough feature, though, is the software that allows you to customize many of the trackball's functions. **Nov 92**

★★★ **Voice Express, MacSema, 503/757-1520, $399.** Voice-recognition board lets you record words or phrases that trigger simple key sequences, but commands are limited to those with keyboard equivalents, and the system is weighed down by several quirky features. **Apr 92**

★★★ **Voice Navigator II, Articulate Systems, 617/935-5656, $699.** Stand-alone SCSI device offers an impressive full-featured set of tools for voice control of your Mac, but mastering them takes time and effort. **Apr 92**

★★★ **Z-Nix Cordless SuperMouse, Z-Nix, 714/629-8050, $99.** Sleek and attractive cordless mouse works reliably and is attractively priced, but suffers from the same line-of-sight limitations as other infrared devices (such as TV remote controls). **Dec 92**

MISCELLANEOUS HARDWARE

★★★ **ACS300 Computer Speaker System, Altec Lansing Consumer Products, 717/296-4434, $400.** Clamshell-shape high/midrange speakers come with a freestanding subwoofer and power supply. The sound is rich and smooth, but the cabling is nonstandard, and there is no on/off switch. **Nov 92**

★★★ **Bose RoomMate speakers, Bose Corp., 508/879-7330, $329.** Shielded stereo speakers with a rich, bassy sound can double as regular stereo speakers. Unfortunately, they're heavy, expensive, and the highs are muddy. **Jun 92**

★★★ **MacSpeaker MS-1, Monster Cable, 415/871-6000, $229.95.** Crystal-clear highs and a meaty midrange are the best features of these shielded stereo speakers. They're beautifully designed for close-up listening, but the bass sounds wimpy. **Jun 92**

★★★★ **Media Control Station, JLCooper Electronics, 310/306-4131, $269.95.** This versatile tool connects to the Mac through an ADB port and offers an easy and intuitive way to cue and edit QuickTime movies, MIDI files, multimedia playlists, and other dynamic datas. **Feb 93**

★★★★ **The Miracle Piano Teaching System 1.0, Software Toolworks, 415/883-3000, $499.95.** Painstakingly crafted music and piano instructor comes with keyboard, software, and 120 songs, including classical, movie-theme, and rock. The program offers encouragement and advice, and ends every lesson with a synthesized orchestra accompaniment. **Oct 92**

★★★★ **The Mouse Yoke, Colorado Spectrum, 303/225-6929, $34.95.** Gadget turns an ordinary mechanical mouse into an aircraft-style steering wheel, or yoke, for use with flight simulators. Simple, elegantly executed concept uses quality materials, but isn't appropriate for driving or shooting games. **Dec 92**

★★★ **Organizer Link II (Model OZ-893), Sharp Corp., 800/321-8877, $129.99.** If you own a 5000-, 7000-, or 8000- series Sharp Wizard, this program and cable allow you to connect it to a Mac serial port to exchange data. It's functional, but does have some minor weaknesses. **Jan 93**

★★★★ **Outbound Notebook System 2030S, Outbound Systems, 303/786-9200, 4/40 $2799, 8/80 $3299, 14/120 $3999.** If raw power is what you're looking for in a notebook computer, this is the hands-down choice. It's lightweight, upgradable, and performs at a level between a IIci and a IIfx, but the screen is only adequate. **Sep 92**

★★★★ **PowerKey 2.0, Sophisticated Circuits, 206/485-7979, $119.** Ingenious, well-designed automated power strip has four surge-protected outlets that are controlled by the keyboard's on/off switch. The equally clever software can turn on your Mac, unattended, run a QuicKeys macro (QuicKeys Lite included), and shut down again. **Dec 92**

★★★★ **Ringo LM, MacSema, 503/757-1520, $189.95.** If your sole phone-line is doing double duty as a fax and voice line, this telephone-line manager device is the answer to your prayers. **May 92**

MODEMS/NETWORK HARDWARE

★★★★ **Comstation 2, PSI Integration, 408/559-8544, $399.** Unusually well-designed software accompanies this fax/data modem. The simple, straightforward interface and handy QuickFax DA are positives; uninformative error messages are minor negatives. **Jun 92**

★★★ **Comstation 4, PSI Integration, 408/559-8544, $499.** An otherwise solid fax/data modem for network use is hurt by an awkward process for distributing faxes, plus the need for a separate file server and fax server. **Jun 92**

★★ **EtherPrint, Dayna Communications, 801/531-0600, $499.** It's possible to connect a single LocalTalk printer to an Ethernet network using this device, but it's an expensive option. **Dec 92**

★★★ **EtherPrint Plus, Dayna Communications, 801/531-0600, $649.** Support four LocalTalk products on an Ethernet network using this device that can also serve as an inexpensive AppleTalk router. **Dec 92**

★★★★ **EtherWrite, Compatible Systems Corp., 303/444-9532, $695.** Elegant and cost-effective device with excellent network-management software allows up to six LocalTalk products to connect to an Ethernet network. **Dec 92**

★★★★ **PathFinder, Dayna Communications, 801/531-0600, $899.** For simple networks, this LocalTalk-to-Ethernet router is a great value, as well as a great timesaver for beginning network managers. It uses AppleTalk only. **Jan 93**

★★★ **PowerModem, PSI Integration, 408/**

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MACWORLD Star Ratings

559-8544, $299. Superior fax software distinguishes this fax/data modem for PowerBooks, but it's not the best choice for those who do a lot of online work that requires a high-speed data modem. **Jul 92**

★★★★ **PowerPort/Gold, Global Village Communications, 415/329-0700, $499.** If you need 14,400-bps throughput, this data/fax modem is a champ. Its improved software and packaging raise the standards for PowerBook modems. **Dec 92**

★★★ **QBlazer, Telebit Corp., 408/734-4333, $599.** If portability is an important issue, this 9600-bps modem's pint size and battery power make it an attractive choice; otherwise, its high price plus the lack of Mac software and send-fax features work against it. **May 92**

★★★ **QuickTel Xeba 9600, Logicode Technology, 805/499-4443, $319.** Sleek, slanty, futuristic-looking fax modem offers all the features you'd expect, including acceptable fax software. **Apr 92**

★★★★ **Sportster 14,400 Fax/Data Modem, U.S. Robotics, 708/982-5001, $599.** Several nice features, including an easily accessible power button and a front-mounted volume-control dial, make this 100 percent Macintosh-ready, 14,400-bps fax/data modem better than average. **Feb 93**

★★★★ **SupraFaxModem V.32bis, Supra Corp., 503/967-2400, $399.95.** Send and receive faxes and data at speeds up to 14,400 bps, with this attractively priced fax/data modem. The software works well; tech support is adequate. **Aug 92**

★★ **Ultima Home Office, Prometheus Products, 503/692-9600, $649.** When it can reliably transmit data at high speeds and the voice bugs are fixed, this fax modem with voice mail will be worth a second look. **Oct 92**

★★ **Viva 14.4/Fax, Computer Peripherals, 805/499-5751, $469.** In data mode, this 14,400-bps fax/data modem performed well, but the software bundled with it is barely adequate. **Jan 93**

★★ **WorldPort 9600 MNP5, U.S. Robotics, 708/982-5001, $475.** Only slighter larger than a deck of cards, this 9600-bps modem is geared toward PC users, with a user guide that never mentions Macs and software that is only for PC compatibles. **Jan 93**

PRINTERS

★★ **C.Itoh ProWriter Printer, C-Tech Electronics, 714/833-1165, $2395.** Not only is this laser printer more expensive than most personal page printers, it offers less-impressive features and so-so output. **Nov 92**

★★★★ **HP LaserJet 4M, Hewlett-Packard, 800/752-0900, $2999.** An Intel i8960 RISC processor makes printing complex images faster than ever with this 600-dpi printer, while the Canon LBP-EX print engine and microfine toner guarantee smooth curves and crisp characters. An autoswitch feature makes it a flexible option for mixed-platform offices. **Feb 93**

★★★ **HP PaintJet XL300, Hewlett-Packard, 800/752-0900, $3495.** The output of this color ink-jet printer won't satisfy demanding graphic arts professionals, but it's great for business users interested in punching up their presentations. **Oct 92**

★★★★ **IBM LaserPrinter 10A, IBM Corp., 800/358-5835, $3995.** Beautifully defined text, razor-sharp line art, clear gray tones—the output from this large, awkwardly designed, 600-dpi PostScript printer is dazzling, and all for under $4000. **Aug 92**

★★★★ **LZR 1560, Dataproducts Corp., 818/887-8000, $3395.** Tabloid-size 400-dpi laser printer blazed through our standard printer speed tests, and produced output noticeably better than that of 300-dpi printers. It's a good choice for a mixed network. **Sep 92**

★★★★ **LZR 960, Dataproducts Corp., 818/887-8000, $2195.** This peach of a personal PostScript printer is compact, fast, and produces excellent output. Our reviewer experienced low-memory error messages, but most memory problems should be solved with the current shipping configuration of 3MB of RAM. **Jul 92**

★★★ **RasterOps CorrectPrint 300, RasterOps Corp., 408/562-4200, $8999.** The cost of high-quality, photo-realistic color printing takes a nosedive with this 300-dpi, dye-sublimation printer. The relatively small (8.1 by 8.6 inches on letter-size media) print area is the only significant flaw. **Oct 92**

★★★★ **RealTech Laser 400, Hardware That Fits, 409/760-2400, $3195.** Exactly the same tabloid-size, 400-dpi printer as the Dataproducts LZR 1560, but for slightly less money. And it produces output that is perceptibly better than that of 300-dpi printers. **Sep 92**

★★★★ **StyleWriter, Apple Computer, 408/996-1010, $399.** If money is tight, you want nice-looking output, and you have a little extra time to spare, this is a good personal printer with a new driver that makes it even better. **Sep 92**

★★★ **TI microLaser Turbo, Texas Instruments, 800/527-3500, $2349.** An enhanced version of TI's microLaser Plus, this PostScript Level 2 printer is an admirable performer and a dependable machine, but it leaves you wondering whether the extra $500 is worth it. **Jul 92**

★★★ **WideWriter, GCC Technologies, 617/890-0880, $1699.** Large-format output comes in a reasonably priced package with this ink-jet printer that can automatically feed sheets as large as 14 by 91 inches or manually feed sheets 17 inches wide with an unlimited length. **Feb 93**

SCANNERS

★★★★ **HP ScanJet IIP, Hewlett-Packard, 800/752-0900, $1095.** An elegant piece of technology, this desktop gray-scale scanner produces excellent results for a street price of around $750. Muddled online help and a flimsy hinge are minor problems. **Aug 92**

★★★★ **LightningScan Pro 256, Thunderware, 510/254-6581, $649.** A well-executed hand-held gray-scale scanner worth the cost. It creates 8-bit scans at up to 400 dpi; images scanned in two passes can be joined flawlessly. The only drawback is slow scrolling in software. **Jun 92**

★★★★ **Mirror 600 Color Scanner, Mirror Technologies, 612/633-4450, $1199.** Three-pass scanner with 600-dpi vertical and 300-dpi horizontal resolution is fast, precise, and an excellent value. The only liability is its somewhat quirky software. **Apr 92**

★★★★ **Nikon LS-3510AF Film Scanner, Nikon, 516/547-4355, 8-bit $9535, 24-bit $11,316.** The bread-box–style design of this 35mm film scanner may be reminiscent of past models, but many changes make it faster and more convenient. Still, advanced users won't be satisfied with the tools for overriding automatic exposure and tone adjustments. **Sep 92**

★★ **PageBrush Professional, Mitsubishi International, 415/544-2781, $795.** A brilliant idea with unfortunate rough spots. Gray-scale, hand-held scanner/mouse scans full-page or larger images and produces 300-dpi gray-scale files, but the process and software are agonizingly slow; the buttons are hypersensitive; and the product is expensive. **Jun 92**

★★★ **RasterOps Expresso Personal Slide Scanner, RasterOps Corp., 408/562-4200, $849.** Essentially a video camera mounted above an illuminated stage, this slide scanner outputs NTSC video. It's fast, convenient, and economical, but falls short for digital images; its best file looks worse than output from a 24-bit flatbed or slide scanner. **Apr 92**

STORAGE/SYSTEMS

★★★★ **Floptika 20/M, Procom Technology, 714/852-1000, $585.** It is easy to recommend this floptical drive due to its speed, relative low-cost, lack of problems, and bundled software. Although it allows invalid SCSI ID addresses, it's a fine product. **Sep 92**

★★★ **Freedom 120, Maxen, 619/944-0818, $699.** Battery-powered hard drive provides three to four hours of hard drive storage without a power cable; it performs at a respectable speed, but lacks a battery-power gauge and automatic sleep mode. The skimpy manual is the most serious problem. **Sep 92**

★★★ **Infinity Floptical 21MB, Peripheral Land, 510/657-2211, $599.** The good points of this floptical drive include extensive documentation, switchable termination, and an autoeject function, but the bad points are the odd size, the incompatibility of the bundled software with System 7, and inappropriate formatting of 800K disks. **Sep 92**

★★ **Performance/040 (33MHz), Impulse Technology, 404/889-8294, $2399.** For disk-intensive tasks, this 68040 33MHz accelerator board tested slower than the native CPU and, in general, was slower than comparable accelerator boards. It is compatible with all Mac II's. **Oct 92**

★★★ **PLI MiniArray 850MB, PLI MiniArray 2GB, Peripheral Land, 510/657-2211, $6999.** These RAID storage systems contain multiple drives that work as a single unit; they're an excellent option for image processing or tasks that involve importing and exporting large files, but the price per megabyte is high. **Jan 93**

★★★ **PowerBook 145, Apple Computer, 408/996-1010, $2149 to $2499.** Adequate but essentially outdated notebook computer is an upgraded version of the discontinued PowerBook 140 with a faster 25Mz 68030 CPU, but RAM expansion is limited, and it doesn't have a built-in video port. **Feb 93**

★★★★ **PowerBook 160, Apple Computer, 408/996-1010, $2429 to $3149.** A built-in video port and gray-scale capability are the new features Apple offers with this notebook computer. While it ffers good processing speed and power, the passive matrix display doesn't cut it for all-day use as a primary screen. **Feb 93**

★★★★ **PowerBook 180, Apple Computer, 408/996-1010, $4109 to $4469.** An active matrix screen and math coprocessor are the only differences between this notebook computer and the PowerBook 180, but the beautiful display is worth the extra $1000. **Feb 93**

★★★ **QuadFlextra, Quadram, 404/923-6666, $495.** Remarkable super-high-density floppy drive uses an ingenious disk formatting method to put just over 20MB on a single 3½-inch floppy disk, but it may not be as cost-efficient as other options. **Apr 92**

★★★★ **Quantum Passport XL 240, Quantum Corp., 800/624-5545, external chassis $469, 240MB drive $979.** An excellent piece of engineering, this fast, trouble-free, removable hard drive is designed to solve the problem of how to transport data from one computer to another. The price is only somewhat discouraging. **Oct 92**

★★★★ **Radius Rocket 33, Radius, 408/434-1010, $2499.** The accelerator board of choice for our reviewer, this 68040 33MHz board is fast, reasonably priced, and compatible with a Mac II (Rev. B ROM), IIx, IIcx, or IIci. **Oct 92**

★★★ **TokaMac II FX 33, Fusion Data Systems, 512/338-5326, $2995.** CPU and FPU tasks on a Mac IIfx are faster than on a Quadra 950 with this 68040 33MHz accelerator board, but video- and disk-intensive tasks are still slower. It may be worth the cost if your IIfx already has a fast video board and more than enough memory. **Oct 92**

VIDEO/DISPLAY

★★★ **BookView Imperial, Computer Care, 612/371-0061, $1399 (includes 6MB of RAM).** This notebook-display adapter supports all common sizes of monitors, including 16-inch and 19-inch, plus both Mac and VGA monitors. It is expensive, however, and uses 2MB of your system memory for video processing. **Feb 93**

★★★ **Canon RC250, Canon USA, 714/753-4320, $799.** An adequate choice for users looking for an inexpensive still-video system. Camera captures up to 50 color images per video floppy and hooks up to any television. **Jun 92**

★★ **Dycam Model 1, Dycam, 818/998-8008, $895.** Compact, point-and-shoot, still-video camera records and downloads images in 8-bit gray-scale—as long as the battery doesn't die first. **Jun 92**

★★★★ **Macintosh 16" Color Display, Apple Computer, 408/996-1010, $1599.** The display quality of Apple's 16-inch monitor is tough to beat. It has realistic color, minimal curvature, and a uniform display. **Jun 92**

★★★ **Power Portrait, Sigma Designs, 510/770-0100, $899 or $949.** Hook your Classic or PowerBook to this 15-inch portrait-style monochrome display. Built-in QuickDraw acceleration speeds up the slow SCSI connection on the one hand and results in a few software incompatibilities on the other. **Feb 93**

★★★★ **PowerVision, Mirror Technologies, 612/633-4450, With no RAM $499, with 2MB of RAM $699, with 4MB of RAM $999.** Separate VRAM means you don't lose system memory with this nicely priced notebook display adapter. It only supports 12-inch and 14-inch monitors, and 15-inch portrait gray-scale and black-and-white monitors. **Feb 93**

★★★★ **VideoSpigot, SuperMac Technology, 408/245-2202, $499 to $1599.** Grab video from a camcorder, video deck, TV, or monitor with this easy-to-install board and save it as a 24-bit QuickTime movie. Comes with ScreenPlay, an application that lets you choose from among several compression options, frame rates, and window sizes. **May 92** m

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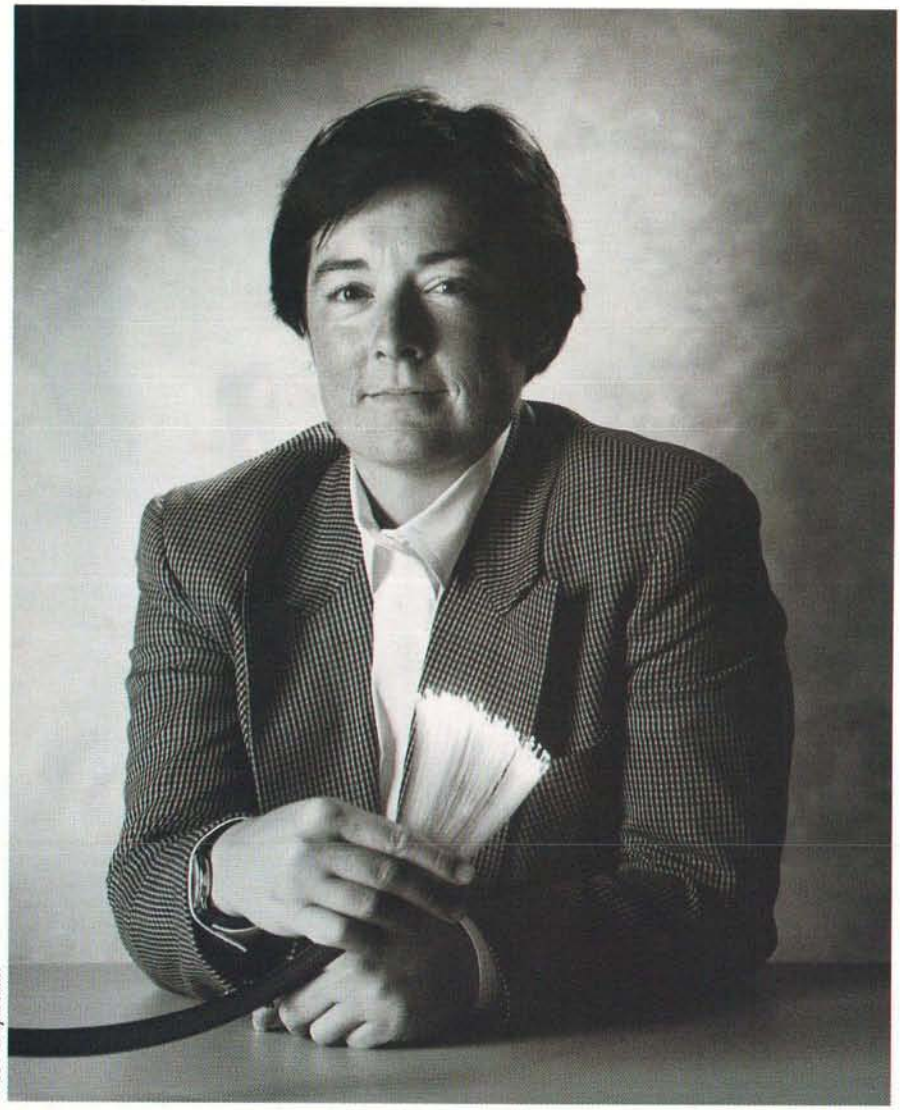

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In 1906 St. Vincent de Paul was founded to help people left homeless by the San Francisco Earthquake. Today, they're an organization that helps thousands of homeless people nationwide. By finding them shelter, medical care, rehabilitation, and jobs.

That's where Christine came in. Before she got involved, St. Vincent de Paul worked with 75 other San Francisco social service agencies matching homeless people with available jobs. The Job Finders Alliance worked hard, but since they only communicated by memo and phone, it could take up to three weeks to match a qualified person with an open job.

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MACWORLD

1992 Index

COMPILED BY ERFERT FENTON

THIS INDEX COVERS THE 12 ISSUES OF *MACWORLD* PUBLISHED DURING 1992. IT LISTS MOST PRODUCTS ALPHABETICALLY AND UNDER SUBJECT HEADINGS. SOME TOPICS ARE CROSS-REFERENCED. (READERS WHO LOOK FOR CALENDAR PROGRAMS, FOR EXAMPLE, ARE ALSO REFERRED TO PERSONAL INFORMATION MANAGERS.) BOLDFACE PAGE NUMBERS INDICATE A MAJOR REFERENCE. AN ELECTRONIC VERSION OF THIS INDEX CAN BE DOWNLOADED FROM THE LIBRARY WITHIN THE MACWORLD RESOURCES FOLDER IN THE MACWORLD FORUM ON AMERICA ONLINE.

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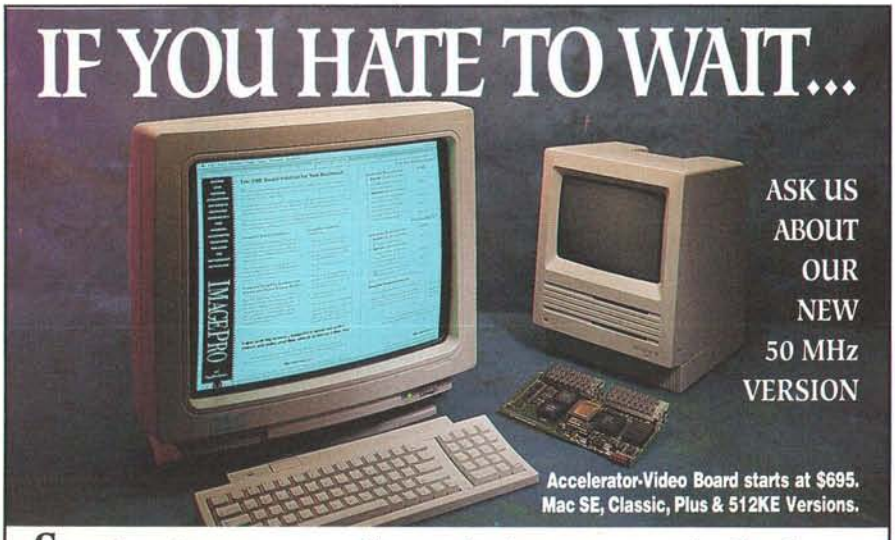

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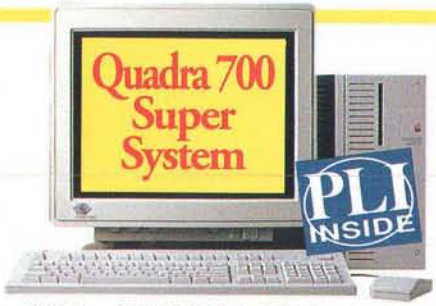

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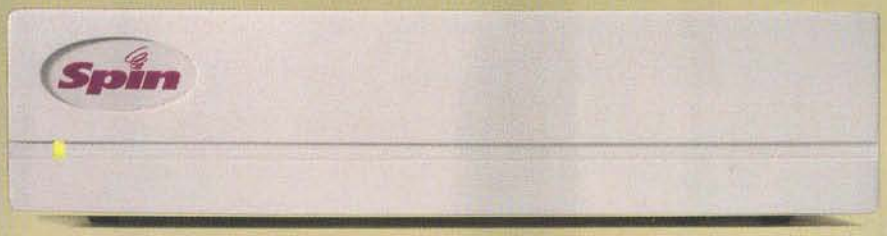

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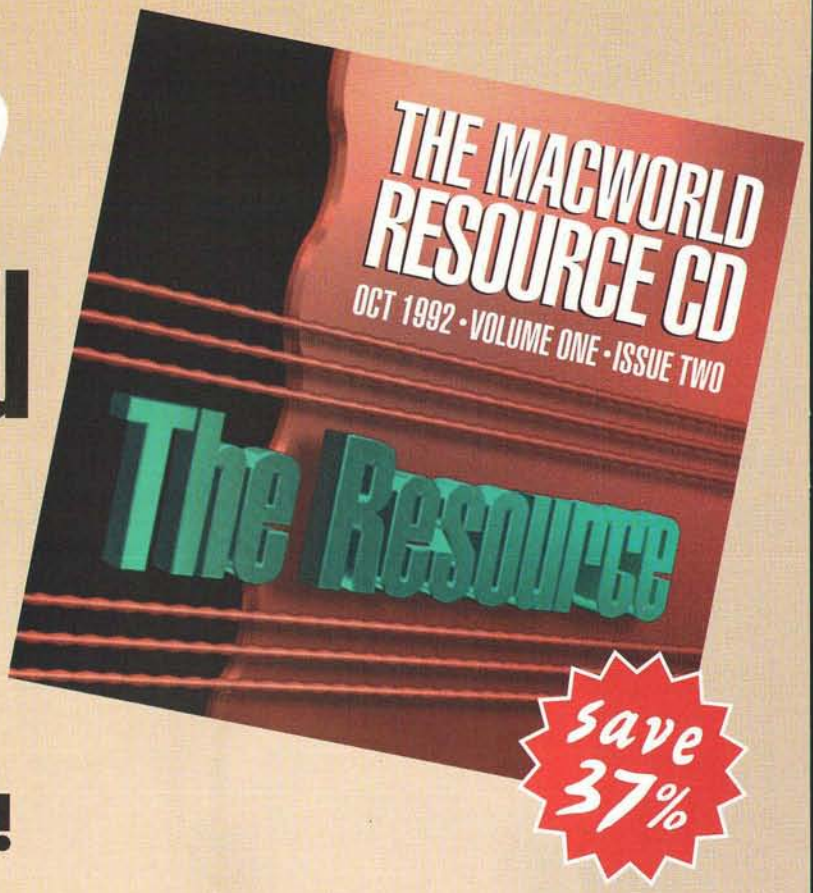

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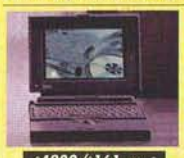

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80mb	GO•80	17ms	80mb	**$329**	**$429**
120mb	GO•120	17ms	120mb	**$459**	**$559**
ELS Drives 3.5" Low Profile & Low Power					
42mb	ELS42	19ms	40mb	**$185**	**$245**
85mb	ELS85	17ms	82mb	**$249**	**$309**
127mb	ELS127	17ms	124mb	**$329**	**$389**
170mb	ELS170	17ms	160mb	**$359**	**$419**
LPS Drives 3.5" Low Profile & High Performance					
240mb	LPS240	10ms	234mb	**$549**	**$609**
NEW **525mb**	LPS525	10ms	525mb	**$1089**	**$1149**
PRO Drives 3.5" High Capacity & Performance					
425mb	PRO425	19ms	406mb	**$899**	**$959**
NEW **700mb**	PRO700	10ms	700mb	**$1279**	**$1339**
NEW **1.0GIG**	PRO1050	10ms	1.0GIG	**$1569**	**$1629**
NEW **1.2GIG**	PRO1225	10ms	1.2GIG	**$1749**	**$1809**

ELS, LPS, and PRO drives have a TWO Year Warranty. Go•Drive have a ONE Year Warranty.

Maxtor Price Point and Performance

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
120mb	7120XT	3.5" Low Profile	15ms	121mb	**$315**	**$375**
207mb	7213	3.5" Low Profile	15ms	202mb	**$475**	**$535**
330mb	LXT-340	3.5" Half Height	15ms	324mb	**$675**	**$735**
535mb	LXT-535	3.5" Low Profile	12ms	510mb	**$999**	**$1059**
645mb	XT-8760S	5.25" Full Height	16.5ms	639mb	**$1229**	**$1329**
1.2GIG	PO-12S	5.25" Full Height	13ms	997mb	**$1519**	**$1619**
1.7GIG	PO-17S	5.25" Full Height	13ms	1433mb	**$1759**	**$1859**

Maxtor 3.5" Drives include a ONE Year Warranty.
Maxtor 5.25" Drives include a TWO Year Warranty.

5 YEAR WARRANTY FUJITSU

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
425mb	M2623SA	3.5" Half Height	9ms	405mb	**$899**	**$1029**
520mb	M2624SA	3.5" Half Height	9ms	496mb	**$1029**	**$1095**
1.2GIG	M2266	5.25" Full Height	14.5ms	1029mb	**$1589**	**$1689**
2.0GIG	M2652	5.25" Full Height	14.5ms	1.6GIG	**$2585**	**$2685**

Seagate ELITE SERIES

Unformatted Capacity	Model	Description			Actual MAC Capacity	Internal	External
645mb	ST4767N	5.25" Full Ht	W-R II	11.9ms	634mb	**$1529**	**$1629**
1.2GIG	ST41200N	5.25" Full Ht	W-7	15ms	989mb	**$1579**	**$1679**
1.6GIG	ST41651N	5.25" Full Ht	W-8	15ms	1350mb	**$1919**	**$2019**
2.1GIG	ST42100N	5.25" Full Ht	W-9	12.9	1900mb	**$2149**	**$2249**
1.6GIG	ST41600N	5.25" Full Ht	Elite-1	11.5ms	1307mb	**$2089**	**$2189**
2.4GIG	ST42400N	5.25" Full Ht	Elite-2	11ms	2050mb	**$2969**	**$3069**
3.4GIG	ST43400N	5.25" Full Ht	Elite-3	11ms	2750mb	**$4149**	**$4249**

Seagate Drives include a ONE Year Warranty.

NEW! CONNER

Unformatted Capacity	Model	Description		Actual MAC Capacity	Internal	External
85mb	CP30080E	3.5" Low Profile	17ms	82 mb	**$239**	**$299**
120mb	CP30100	3.5" Low Profile	19ms	116 mb	**$319**	**$379**
170mb	**CP30170E**	3.5" Low Profile	9ms	160 mb	**$339**	**$399**
212mb	**CP30200**	3.5" Low Profile	9ms	206 mb	**$469**	**$529**
540mb	**CP30540**	3.5" Low Profile	8.5ms	515 mb	**$1095**	**$1155**

ClubMac OPTICAL Drives

Model		Capacity	Description	Seek	External
CMO-OD3000	Teac	128mb	3.5" Half Ht	45ms	**$1049**
CMO-LF3004	Panasonic	128mb	3.5" Half Ht	45ms	**$1169**
CMO-3100E	Ricoh	128mb	3.5" Half Ht	45ms	**$1249**
CMO-3051E	Ricoh	594/652mb	5.25" Full Ht	28ms	**$2695**
CMO-5030E2	Ricoh	594/652mb	5.25" Full Ht	66.7ms	**$2149**
128mb Cartridge		3.5" Single Sided			**$39**
594/652mb Cartridge		5.25" - 512/1024 bytes/sec			**$99**

All ClubMac Opticals include ONE cartridge and ONE Year Warranty.

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Capacity	Model	Description	Media	Internal	External
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2.0GIG	WangDAT 1300XL	DAT, DDS	4mm	**$1299**	**$1329**
3-5GIG	WangDAT 3200	DAT, DDS-DC	4mm		**$1549**
2.0GIG	HP 35470A	DAT, DDS	4mm	**$1349**	**$1389**
3-5GIG	HP 35480A	DAT, DDS-DC	4mm	**$1539**	**$1569**
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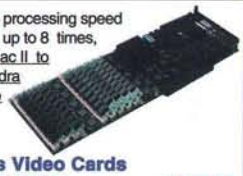

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20" Sampo Grayscale

Includes 20" Monitor, 8-Bit Video Board, & Cable Complete!

$799
Monitor Only $599

Special Value! An affordable high quality, 20 inch grayscale monitor package - complete - for less than $800! The Sampo 20" OfficePro IIa grayscale is featured by many "major brands" for hundreds more! Why pay extra? If you are not satisfied we will give you your money back!

14" Color Monitor $359 • 14" Color Package $499

14" Color Monitor Only	*359*
14" Color Monitor - 256 Color Package	499
20" Grayscale Monitor Only - Sampo	*599*
20" Grayscale - 256 Package - NuBus	799
20" Grayscale - 256 Pkg.- LC, LCII, SE/30	999
20" Grayscale Monitor Only - Ikegami	*799*
20" Grayscale - 256 Package - NuBus	999
20" Grayscale - 256 Pkg.- LC, LCII, SE/30	1,199
20" Trinitron Monitor Only	*1,799*
20" Trinitron - 256 Color Package	1,999
20" Trinitron - 16 Million Color Pkg.	2,649

All Packages Include Monitor, Video Board & Cable!

We feature RasterOps Products RASTEROPS

PaintBoard 24	*1,529*	*PaintBoard Li*	*829*
24STV	*789*	*8XL*	*479*
ClearVue/Classic	*229*	*ClearVue/SE*	*329*
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600 Meg. ISO Optical

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- *Low Cost - High Performance*

Large, fast and affordable. We offer a variety of solutions for your large capacity data storage needs. 110/220 VAC.

600 Meg. Ricoh ISO 5030E-I 1,499
While Supplies Last - Limited Quantity!
Lowest cost per megabyte - 67 ms. average access.

600 Meg. Optimem ISO Model 750 1,799
Premium Quality at Low Cost - 60 ms. average access.

600 Meg. Ricoh ISO 5030E-II 2,199
Lowest cost per megabyte - 67 ms. average access.

600 Meg. Ricoh ISO 5031E New! 2,699
High performance - 35 ms. average access.

128 Meg. Optical
Macintosh & IBM compatible
$1,149

Each 3-1/2" erasable optical cartridge holds over 120 megabytes of data! *The* ***Sierra MO*** *(shown) is an ideal primary or backup storage device for IBM or Macintosh personal computers. Complete package - includes SCSI cable, Mac software, and external power supply. Specify 110 or 220 VAC.*

Includes media, software & cables!

128 Meg. Ricoh ISO 1,299
128 Meg. Epson ISO 1,149
128 Meg. Cartridge - Each 39
128 Meg. Cartridge - 10 Pack 349

SyQuest Drives

SyQuest 44 Meg. Cartridge - Each 68
SyQuest 44 Meg. Cartridge - 10-Pack 619
SyQuest 88 Meg. Cartridge - Each 109
SyQuest 88 Meg. Cartridge - 10-Pack 959

Complete System - includes cables, carrier, and software.
All drives are pretested and are warranted for 24-months. The Relax Mobile is a complete package - all cables and software are included - at no additional charge!

$399 **SyQuest 44**

$499 **SyQuest 88**

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OUR 15 1978 ANNIVERSARY

Hard Disk Drives

	Internal	External
Seagate *3-1/2" Half Height*		
108 Meg. - ST1133N, 15 ms.	*299*	*359*
240 Meg. - ST3283N, 12 ms.	*569*	*629*
510 Meg. - ST1581N, 14 ms.	*1,139*	*1,199*
5-1/4" Full Height - WREN		
300 Meg. - ST4350N, 16.5 ms.	*939*	*999*
600 Meg. - ST4702N, 16.5 ms.	*1,339*	*1,399*
1.0 Gig. - ST41200N, 15 ms.	*1,639*	*1,699*
1.4 Gig. - ST41651N, 15 ms.	*1,999*	*2,059*
1.9 Gig. - ST42100N, 12.9 ms.	*2,539*	*2,599*
5-1/4" Full Height - WREN Runner		
330 Meg. - RUNNER, 10.7 ms.	*1,039*	*1,099*
660 Meg. - RUNNER, 11.9 ms.	*1,439*	*1,499*
5-1/4" Full Height - ELITE Ultra-High Performance		
1.4 Gig. - ELITE-I, 11.5 ms.	*2,139*	*2,199*
2.1 Gig. - ELITE-II, 11 ms.	*2,939*	*2,999*
3.5 Gig. - ELITE-III, 11 ms.	*3,939*	*3,999*
Fujitsu *3-1/2" Half Height*		
425 Meg. - 2623SA, 9 ms.	*1,039*	*1,099*
520 Meg. - 2624SA, 9 ms.	*1,139*	*1,199*
5-1/4" Full Height		
960 Meg. - 2266SA, 11.5 ms	*1,639*	*1,699*
1.7 Gig. - 2652SA, 11.5 ms	*2,639*	*2,699*
Toshiba *3-1/2" Half Height*		
880 Meg. - MK438FB, 9 ms.	*1,239*	*1,299*
1.2 Gig. - 2624SA, 9 ms.	*1,839*	*1,899*

	Internal	External
Conner *3-1/2" Half Height*		
42 Meg. - CP3040, 25 ms.	*239*	*299*
85 Meg. - CP-30080E, 17 ms.	*299*	*359*
120 Meg. - CP-30100, 19 ms.	*359*	*419*
Quantum *3-1/2" ELS*		
42 Meg. - ELS42, 19 ms.	*189*	*249*
85 Meg. - ELS85, 17 ms.	*269*	*329*
127 Meg. - ELS127, 17 ms.	*329*	*389*
2-1/2" - "Go•Drive" Series - for PowerBook only		
80 Meg. - Go•Drive 80, 16 ms.	*339*	*399*
120 Meg. - Go•Drive 120, 16 ms.	*499*	*559*
3-1/2" PDS Series		
1.2 Gig. - PD1225S, 11 ms.	*1,839*	*1,899*
Maxtor *3-1/2" Low Profile/Low Power*		
120 Meg. - 7120S, 17 ms.	*339*	*399*
5-1/4" Full Height		
645 Meg. - XT8760, 16.5 ms.	*1,399*	*1,459*
1.0 Gig. - Panther, 13 ms.	*1,499*	*1,559*
1.5 Gig. - Panther, 13 ms.	*1,799*	*1,859*
Hewlett Packard *3-1/2" Half Height*		
400 Meg. - HP2235, 12.6 ms.	*939*	*999*
1.0 Gig. - HP2247, 12.6 ms.	*2,039*	*2,099*
5-1/4" Full Height		
1.0 Gig. - HP97558, 13.5 ms.	*1,939*	*1,999*
1.3 Gig. - HP97560, 13.5 ms.	*2,399*	*2,459*

Modems

Xeba FAX/Modem 2400/9600 129
v.42bis 9600 bps FAX and 2400 bps modem. Includes QuickLink II Mac software & cable. Hayes compatible, self diagnostics.

PowerBook Portable FAX/Modem 199
Selectek battery powered v.42bis 9600 bps FAX and v.22bis 2400 bps MNP 5 modem. Includes charger, Mac software and cable.

Supra Modems

All Supra Products have a 5-year Warranty

Supra Modem 2,400 89
v.22bis 2,400 bps modem. No software or cables.

Supra Modem 2,400 - MacPac 119
v.22bis 2,400 bps modem (9,600 with data compression). Complete package includes Macintosh software and cable.

SupraFAX Modem Plus 2,400 199
2,400 bps modem/9,600 send-receive FAX. v.42bis data compression for up to 9,600 bps data in a low-cost package. Includes STF Technologies and MicroPhone software and cable.

SupraFAX Modem v.32 9,600 299
9,600 bps modem/9,600 send-receive FAX. v.42bis data compression for up to 38,400 bps data. Includes STF Technologies and MicroPhone software and cable. Performance and low-cost!

SupraFAX Modem v.32bis 14,400 349
14,400 bps modem/14,400 send-receive FAX. v.42bis data compression for up to 57,600 bps data. Includes STF Technologies and MicroPhone software and cable. Complete! Why pay more?

Ethernet

ASANTÉ

Asanté MacCon3 - 64K 199
The 3-in-1 (Thick, Thin and 10BaseT) Ethernet card for most expandable Macintoshes including the IIsi and SE/30. Not available for the LC or LCII.

Asanté MacCon+ - 64K 159
Economical, 64K high-performance Ethernet for almost every model of Macintosh. Select either Thick/Thin or Thick/10BaseT. The MacCon+ LC, LCII and IIsi models have a socket for a co-processor.

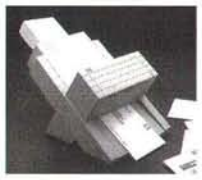
Asanté FriendlyNet Adapters 79
Designed to work with the new Apple Ethernet cabling system - a plug-and-play networking system which makes Ethernet connectivity as simple and easy as LocalTalk.

Asanté 10BaseT Hub/8 239
An economical way to expand your Ethernet network using unshielded twisted pair wiring (10BaseT). Supports IEEE specifications.

Asanté 10BaseT Hub/12 479
A more sophisticated and larger version of the Asanté 8-port Hub. The most economical way to expand your Ethernet network using unshielded twisted pair (UTP, 10BaseT). Fully supports IEEE specifications.

Asanté Print 349

CoStar Printers



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CoStar
AddressWriter envelope and label printer

AddressWriter Printer 479
It takes only 15 seconds to print a #10 size envelope using the AddressWriter's 144 x 144 impact dot-matrix print head. Attaches directly to your computer or share on a network with the optional AppleTalk Adapter. Holds 100 envelopes or 200 postcards. The optional label feeder will handle a pin-fed labels for added convenience and value.

Label Feeder Adapter 75
AppleTalk Network Adapter 189
AppleTalk 5-User Site License 139

LabelWriter II & LabelWriter II Plus personal label printers

$199

The LabelWriter II and II Plus use thermal technology to produce high-quality labels. It takes less than 7 seconds to print a label. Attach directly to your computer or share on a network with the AppleTalk Adapter.

LabelWriter II Mac 199
Handles up to 350 labels per roll. Max label size: 1-1/8" x 3-1/2". Prints one label in 3-1/2 seconds.

LabelWriter II Plus Mac 299
Handles up to 700 labels per roll. Max label size: 2-1/4" x 4". Prints one label in 3-1/2 to 7 seconds.

AppleTalk Network Adapter 189
AppleTalk 5-User Site License 139

Tape Drives

Tape Drives include: media; software; and cables!

160 Meg. Tape Vista - TEAC 499
250 Meg. Tape Vista - Archive 699
600 Meg. Tape Vista - TEAC 779
"Editor's Choice Award" - MacWorld Dec. '92
2.0 Gig. DAT Sierra - R-Byte 1,199
2.0 Gig. DAT Sierra - Archive 1,299
2.0 Gig. DAT Sierra - Hewlett Packard 1,399
2.2 Gig. Tape Vista - ExaByte 1,949
5.0 Gig. Tape Vista - ExaByte 3,199
8.0 Gig. DAT Sierra - R-Byte (New!) .. 1,399
8.0 Gig. DAT Sierra - Archive 1,499
8.0 Gig. DAT Sierra - Hewlett Packard 1,599

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Circle 212 on reader service card

The Max for the LC, LCII, and Performa 400.

Transform the Macintosh LC, LC II and Performa 400 into a powerhouse Macintosh workstation.

Three Slots Instead of One

The MAX gives you three true PDS expansion slots. Now you can utilize any combination of accelerators, ethernet cards, multimedia boards and large screen video solutions – all at once.

Two Internal Hard Drives

The MAX offers a second internal hard drive bay that allows installation of low profile and 3.5" half-height hard drives.

Energize Your LC

The MAX adds a supplemental 40-watt universal power supply, more than doubling the Mac LC's power capacity.

Plug-and-Play

Best of all, The MAX is a breeze to install – just unpack it and stack it. Assembly takes just seconds while the MAX snaps into place.

DGR's MAX supports all Apple-compatible PDS expansion cards, including:

- Apple IIe emulation card
- Applied Engineering
- Asanté
- Dayna
- DayStar Digital
- E-Machines
- Envisio
- Farallon
- Fusion Data
- Lapis
- RasterOps
- Radius
- SuperMac
- Technology Works

$349

DGR's MAX Includes:

Supplemental 40-watt Power Supply

Second Internal Hard Drive Bay

3-slot PDS Expansion

Quite simply, the ability to expand your LC.

In one pure solution, The MAX provides additional power, internal real estate for hard drive expansion, and three slots for any Apple-compatible PDS expansion cards. Imagine adding greater speed, video power and networking capabilities to a low-cost Mac – and that's just the beginning! MAX installation is simply plug-and-play. In just seconds The MAX snaps into place between the Macintosh CPU base and the LC lid. No tools are needed, no parts discarded, and the Macintosh is in no way permanently altered.

Above all else, The MAX is an integrated solution designed to complement the aesthetic of Macintosh computing. Call DGR Technologies, and take your LC to the MAX.

Backed by the DGR Technologies 30-day money-back guarantee, one-year warranty and toll-free technical support. Call toll-free for more information.

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Circle 53 on reader service card

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DW32

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128MB Epson Mechanism 768Kb/s
34ms Access. 1ms Short Seek
$1199

▶ DGR 256REM
256MB MOST Mechanism 1.23Mb/s
35ms Access. 12ms Short Seek
$1699

▶ DGR Cartridge
NEW! DGR Technologies 3.5" Data Storage Cartridges
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NEW! Anubis™ driver software – up to 35% faster than FWB Hard Disk ToolKit PE™

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SyQuest

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88 Megabyte Hard Drives $449

Cartridges:

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Singles	$97

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LC II Systems
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3/40	$2,099	17/240	$3,189

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Circle 30 on reader service card

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The National Arbor Day Foundation

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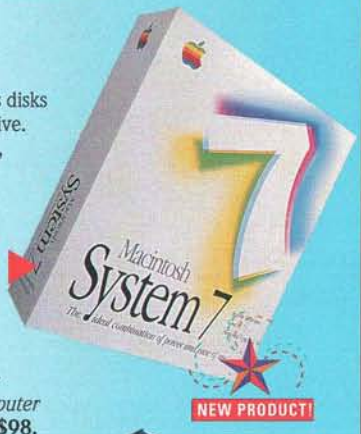
Apple Computer
5248 Apple Font Pack ..... $68.

Macintosh PC Exchange

Now you can conveniently work with PC files from 3.5" or 5.25" DOS and Windows disks on your Mac. Just insert the disk into your Apple SuperDrive or compatible floppy disk drive. Subdirectories on on the disk appear as folders, and data files as documents. You can open, change, and save DOS documents just like they were Mac files.

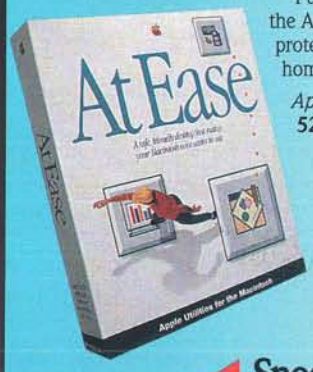
Apple Computer
4609 Macintosh PC Exchange ..... $69.



System 7.1

The latest System 7 version, System 7.1, installs easily with one click of the mouse. A new font folder for central installation and storage and World Script support for complex character sets such as Japanese are new features. System 7.1 also includes all the fixes now included in the System 7 Tune-Up extension. And for a limited time, you get At Ease free with System 7.1.

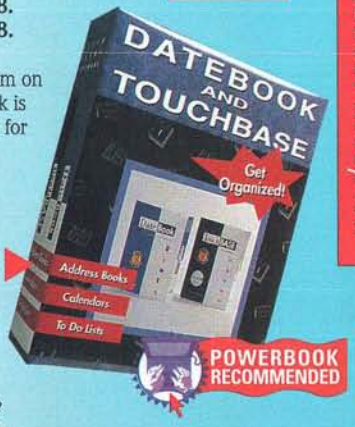
Apple Computer
5255 System 7.1/At Ease ..... $98.
5485 System 7.1 Multipack (10-user) ..... $388.



At Ease

Put your mind at ease. You choose which applications you'll allow others to access and put them on the At Ease desktop. Then those applications open with a single click and the rest of your hard disk is protected by a password. The At Ease desktop has no trash can, so all your files are safe. It's great for homes with computers and children.

Apple Computer
5247 At Ease ..... $49.



DateBook/TouchBASE bundle

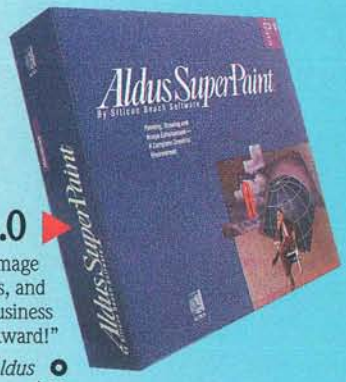
Get organized with this bundle at a fantastic price. **DateBook** is the ultimate personal time manager. It combines calendar, scheduling, alarms, and To-Do lists to keep track of all your daily activities. And **TouchBASE** keeps all of your personal contacts at your fingertips. Together they form a powerful personal information manager.

After Hours Software
5002 DateBook/TouchBASE Bundle ..... $98.

Snooper 2.0

New Snooper 2.0, the desktop diagnostic for the Macintosh, performs over 200 tests and benchmarks on all hardware and identifies any problems. This revolutionary software not only saves you time and money, it increases your awareness of what's going on inside your Mac. And for a limited time, Snooper comes with Virex anti-viral software for the Mac, free.

MAXA Corporation
5376 Snooper 2.0 w/Virex ..... $128.
5377 Snooper 2.0 – NuBus Card w/Virex ..... $178.



Aldus SuperPaint 3.0

SuperPaint does it all. And at a special low price. It combines painting, drawing, and image enhancement in one powerful, easy-to-use graphics program. With 24-bit color, textures, gradients, and full color TIFF and EPS graphics support, SuperPaint is ideal for anything from the simplest business illustrations to sophisticated full-color art. A six time winner of *Macworld's* "Readers Choice Award!"

Aldus
3545 SuperPaint 3.0 ..... $98.

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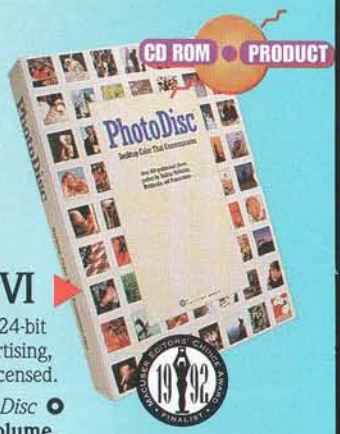
NEW PRODUCT!

Infini-D 2.0/BackBurner

Infini-D 2.0 is up to 500 percent faster than other rendering programs, can produce broadcast-quality images and animations, and imports and exports QuickTime! It's a great addition for artists using programs like Illustrator, Photoshop, or Premier. And **BackBurner** does networked background rendering in a fraction of the usual time.

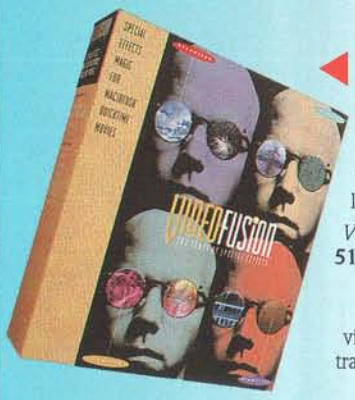
Specular
4818 Infini-D 2.0 ..... $648.
5570 BackBurner ..... $370.
5574 BackBurner 5 Pack Add-on ..... $928.



PhotoDisc CD Vol. I - VI

Get instant access to hundreds of pixel-perfect photographs! Each image is in spectacular 24-bit color, and shot by top-notch professionals. You're free to use PhotoDisc images in all your advertising, newsletters, and multimedia presentations because they're all model-released and licensed.

PhotoDisc ○
PhotoDisc CD-ROM Vol. I - VI ..... $288/per volume.
5522 PhotoDisc MultiMedia Sampler ..... $37.



VideoFusion

Now the same special effects you've seen in television and film presentations can be created on your Macintosh. VideoFusion lets you add magic to your QuickTime movies, video productions, and presentations. Using standard Mac terminology like "cut," "copy," and "paste," you can apply the latest special effects from VideoFusion's library or create your own. Four stars from *MacWEEK!*

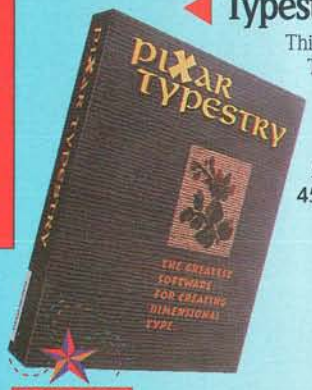
VideoFusion
5165 VideoFusion ..... $448.

NEW PRODUCT!

Morph

Morphing is the popular new special effect you've seen in feature films, music videos, and television commercials. This breakthrough application allows you to smoothly transform two or more images into each other creating QuickTime movies, PICS animations, and still images. Morph is fast, easy to use, and requires no special skills.

Gryphon Software
5513 Morph ..... $95.



NEW PRODUCT!

Typestry

This exciting new software creates dimensional text from PostScript Type 1 and TrueType fonts. Typestry uses RenderMan to transform simple words into extraordinary pictures. It accurately simulates metals, woods, or other types of surfaces which can be used to decorate text. Users can also move, rotate, scale, and extrude words.

Pixar ○
5123 Typestry ..... $184.
4554 ShowPlace/MacRenderMan 1.1.1 CD-ROM ..... $318.

Series 1 Photography Filters

Hot new PhotoShop filters! Series 1 Photography Filters are software filters for Photoshop that emulate 35mm camera optical filters. Now you can generate optical effects other than the painterly effects of Aldus Gallery Effects. These filters are perfect for both the graphic artist and the photographer creating ads, brochures, advertising, and video presentations.

Andromeda Software
5161 Series 1 Photography Filters ..... $79.

Painter 1.2/ArtZ 6"x 8" Tablet bundle

NEW PRODUCT!

Simulate the tools and textures of natural media with **Painter**, the remarkable 24-bit color paint program. Create original art or apply natural media effects to other artwork, including scanned images. Used with the **ArtZ 6" x 8" Tablet**, the effects are astonishing. The latest from the premiere tablet maker, ArtZ's stylus is cordless, batteryless, and detects 120 levels of pressure.

Fractal Design /Wacom Technology ○
4694/5355 Painter 1.2 /ArtZ 6" x 8" Tablet ..... $508.

Sketcher 1.0

Create realistic natural-media effects on your Mac with Sketcher, the affordable yet revolutionary program for creating grayscale graphics and retouching images. Sketcher duplicates the effects of traditional tools and textures. Use dozens of brushes, pens, chalks, and even paper grains and image processing tools to apply your artist's touch to the desktop.

Fractal Design ○
5052 Sketcher 1.0 ..... $98.

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NEW PRODUCT!

WorldLink

Be a part of the Internet with just your Mac, a modem, and WorldLink. You'll have access to over 15 million people via e-mail, countless files to download, and all the other resources the Internet has to offer. Your first 30 days of access are free; a monthly service charge applies thereafter.

InterCon ●
5195 WorldLink ..... $26.

DataPlace Hard Drives

These are the most reliable drives around. Preformatted with the included DP Formatter Plus, they're ready to use right out of the box. And they come with three more free utilities: MacTools 2.0, StuffIt SpaceSaver, and Kaboom! SE. Each also includes manuals, cables, a two- or five-year warranty, and technical support from Mac's Place.

DataPlace ●
5277 DP+ 42MB Quantum External Drive ..... $328.
5278 DP+ 85MB Quantum External Drive ..... $422.

Call for pricing on the complete line of DP+ Drives.

MacIntercomm

The first and only telecommunications program with true multitasking that offers completely invisible file transfers. With a scripting language of unprecedented power, full protocols and terminal emulation, you'll agree that MacIntercomm defines the new standard in telecommunications. Includes a SmartDial feature for traveling users, and many more features.

Mercury Systems ●
5111 MacIntercomm ..... $78.

StuffIt Deluxe & Stuffit SpaceSaver

Only **StuffIt Deluxe 3.0** can solve all your compression needs from archiving to transparent compression. StuffIt will save you time and money on file transfers over your modem or network. It's the standard for all electronic services and the most efficient compression product available. Also includes StuffIt SpaceSaver. Unlike other compression products, **StuffIt SpaceSaver** increases disk space with lightning speed and without effort on your part. Direct it to work while your Mac is idle or when you request. SpaceSaver is the least expensive, most productive, and easiest-to-use compression product.

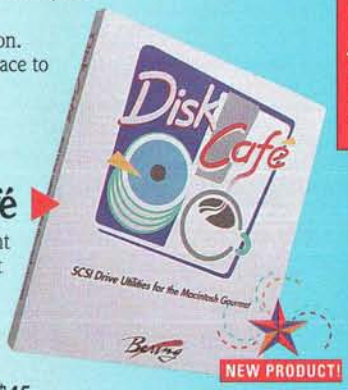
Aladdin Systems ●
4971 Stuffit Deluxe ..... $68.
4969 Stuffit SpaceSaver ..... $38.

SONY Data Media

Save your data with confidence. SONY brings you innovative products to protect your information. Diskettes, data cartridges, and magneto optical disks give you durability and reliability. Call Mac's Place to learn more about all the SONY products to meet your needs.

SONY
5612 3.5" DD Color 10-pack ..... $10.
3090 3.5" HD 10-pack ..... $15.
3687 Data Grade 90M 2 GB DAT Tape ..... $22.
4474 MO Rewritable 650MB 5.25" ..... $138.

Disk Café



NEW PRODUCT!

If you use drives from different manufacturers, you need to format them all with the same utility. Disk Café is a complete storage formatting utility that works with nearly every drive available. So it can prevent compatibility problems including data loss. And its advanced diagnostic tools detect and repair disk defects.

Bering Industries, Inc.
5121 Disk Café ..... $45.

IT'S EASY TO ORDER!

ORDERING INFORMATION
- Call 1-800-367-4222 anywhere in the USA or Canada. Call (206) 883- 8312 for international orders.
- Fax your order to 206-881-3090.
- Mail your order to 8461 154th NE, Redmond, WA 98052.
- For electronic orders, use Compuserve (76635,660), GEnie (MACSPLACE), or America Online (MacsPlace). Mac's Place uses CE Software's QuickMail to check our mail regularly.

ORDERING HOURS
- Mac's Place is open from 6 a.m. to 10 p.m. M-F Pacific Standard Time, and 6 a.m. to 6 p.m. on weekends. (For you East Coasters, this means you can call us until 1 a.m. weekdays and still receive your in-stock item that morning!)

PAYMENT OPTIONS
- VISA, MasterCard, American Express, OPTIMA, and Discover Card gladly accepted.
- Your credit card is never charged until your product ships.
- Most personal and company checks are approved quickly to ensure immediate shipment. For non-standard checks and checks over $1,000, allow ten working days for clearance.
- Government, school, and institutional P.O.s clear immediately. Corporate P.O.s are subject to credit approval for first order.

SHIPPING INFORMATION
- All in-stock items ship same-day, (barring system failure, etc.) to your doorstep, for just $3 (USA) via Airborne Express overnight service. Rural locations may require an additional day for delivery. Areas not serviced by Airborne Express will be sent via Priority Mail. Our $3 shipping charge includes insurance at no extra charge.
- When a partial order is shipped, we pay freight on additional shipments.

INTERNATIONAL ORDERS
- Call 206-883-8312 for our international sales line.
- We ship throughout the free world via Airborne Express International.
- International orders will be charged full shipping rates.
- Mail, fax, or electronic orders gladly accepted.

RETURNS
- All products carry a 120-day limited warranty from Mac's Place.
- Defective software is replaced immediately with like items. Defective hardware items repaired or replaced at our discretion.
- Some hardware items carry one-, two-, or five-year warranties.
- Products with the ● symbol carry a manufacturer's 30- or 60- day Money Back Guarantee.

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GamePad Mac

Perfect for all Mac games. Use the thumb-operated pad as a mouse on "point-and-click"games. The keystroke option gives you directional control for "keyboard only" games. Or screw in a joystick for hand-held control. Set-up is a breeze. Works on Macs from the SE to Quadra, including PowerBook.

Advanced Gravis ○
5172 GamePad Mac ..... $34.

Bernoulli MacTransportable 90 PRO

Get all the storage reliability you'd expect from Bernoulli for 40 percent less! The new MacTransportable doesn't require an interface kit. Everything you need to get up and running is in the box including a 90MB cartridge. Ask about the ***NEW*** Bernoulli MacTransportable 150.

IOMEGA ○
5012 Bernoulli MacTransportable 90 PRO ..... $499.
5609 Bernoulli MacTransportable 150 ..... Call.

POWERBOOK RECOMMENDED

Lemmings

Lemmings for the Mac has arrived! Now Mac owners can demonstrate their game playing smarts and test their sanity, saving mobs of imperiled green-haired rodents from certain doom. Lemmings for the Mac brings you 120 levels of original and intellectually challenging gameplay.

Psygnosys
5459 ..... $35.

TimesTwo

TimesTwo actually makes your hard disk bigger rather than making your files smaller! A one-time installation converts your hard disk to twice its original size in minutes, leaving your data unchanged. It's completely compatible with all Mac software and works with all SCSI and erasable optical disks.

Golden Triangle ○
5233 TimesTwo ..... $99.

M 4 Tank Simulator

You and your buddies go for a ride. Only it's WWII, it's a long way to Germany, and your ride is on an M4 Sherman tank. Full color, sound, and voice-commands give this authentic simulation a dramatic realism.

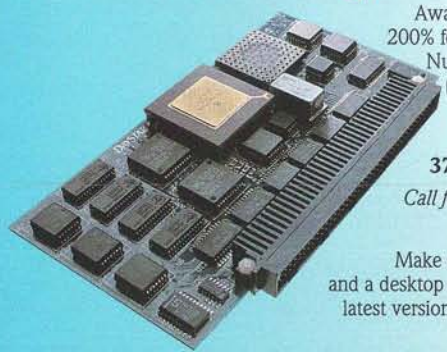
Deadly Games ○
5360 M4 Tank Simulator (w/headphones, color) ..... $34.
3895 Battle of Britain II (color) ..... $34.
3894 Bomber 2 (w/headphones) ..... $31.

Virex

Virex detects and repairs files infected by all known Mac viruses. Then it prevents infection by continuously monitoring files and performing instantaneous repairs. It also keeps your network virus-free with scheduled virus scans. Virex is updated frequently to combat new viruses, and all registered users receive one free update.

DataWatch ○
5234 Virex 4.0 ..... $62.
5235 Virex 4.0 10 Pack ..... $428.

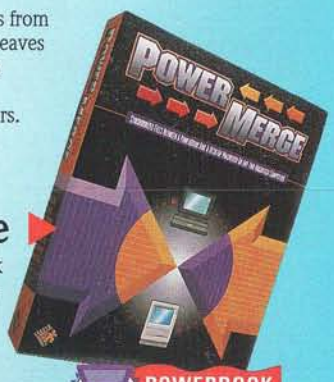
Universal PowerCache Card



Award-winning PowerCache is a 68030 CPU accelerator that offers speed increases from 200% for a IIci to 1,000% for a Mac Classic. Universal PDS design supports 14 Macs, leaves NuBus slots empty. Guaranteed 100% compatible running at full speed. Adapters (required for most installations) may be swapped with DayStar at no charge. Classic and SE users may purchase adapters that support monochrome monitors.

DayStar Digital ○
3744 PowerCache 50MHz w/FPU ..... $1398.

Call for complete pricing on all DayStar Digital products.



Power Merge

Make sure you're working on the latest version of your files when using a PowerBook and a desktop Mac with PowerMerge. It's the first software that not only tells you where the latest version resides – it puts all versions in sync. It includes conflict notification, a history log, and updating via network or removable media.

Leader Techologies ○
5010 PowerMerge ..... $79.

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*U.S. only. Offer expires Feb. 28, 1993.

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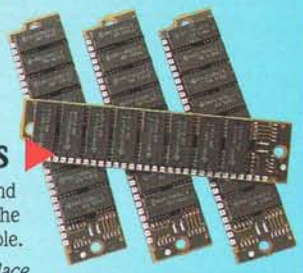
Microsoft Word 5.1

Upgrade to Microsoft's newest Word, and get more tools that make every day easy. Just click buttons on the new unique customizable toolbar to do dozens of common tasks in one step – tasks like checking spelling, making envelopes, and adding bullets. Or change the buttons to best suit your own tasks.

Microsoft ✪
5567 Microsoft Word 5.1 ..... $294.
5571 Microsoft Works 5.1 version Upgrade ..... $124.



SIMMs

Expand the memory of your Mac! More memory means increased task processing and the ability to switch between several applications running at once. Also includes the Mac's Place installation manual, the most complete SIMM installation guide available.

Mac's Place
SIMMs ..... Call.

Atlas Pro

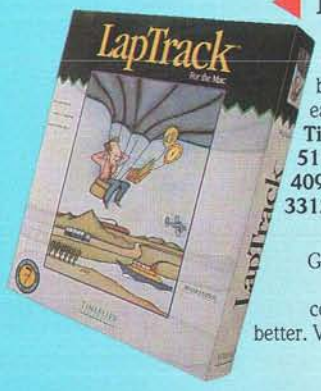
Import data from your spreadsheet or data management program and turn it into striking presentation-quality maps with Atlas Pro. It's an analysis tool that gives brilliant show-quality results. And it's bundled with a wealth of geographic data sets taken from the 1990 census, hundreds of digital maps, and lots of additional data.

Strategic Mapping Inc. ✪
5458 Atlas Pro $498

CA-Cricket Graph III/CA-Cricket Draw III

With **CA-Cricket Graph III**, you can convert text or data into a complete, professional-looking graph in seconds. Choose from scatter, pie, area, and many other options. **CA-Cricket Draw III** is the object-oriented bezier drawing program for all ability levels. It includes Postscript support, full-featured text processing, and special text effects like rotation.

Computer Associates ✪
5001 CA-Cricket Graph III ..... $128.
4218 CA-Cricket Draw III ..... $168.



LapTrack for the Mac

Great for PowerBooks! Record time and expenses more easily than ever before – whether you're in the office or in the field. Reports include time and expense sheets, budgeting, productivity analysis reports and graphs. Address book feature allows you easy access to each client.

Timeslips Corp. ✪
5110 LapTrack ..... $52.
4096 Timeslips III V.2.1 ..... $192.
3312 Timeslips Accounting Link ..... $49.

Microsoft Works

Get the tools you need to combine words, numbers, and graphics any way you want. With a word processor, database with reporting, spreadspreadsheet with charting, drawing, and communications, Works is the best-selling integrated software for the Mac. And now it's even better. Version 3.0 is faster, easier, better integrated, and runs on all Macs, including the PowerBook.

Microsoft ✪
5068 Microsoft Works version 3.0 ..... $159.
5071 Microsoft Works version 3.0 Upgrade ..... $79.

Act! For The Mac

This unique, integrated contact and calendar management solution handles your hectic schedule. Act! schedules calls, meetings, and to-do's; generates a variety of written correspondence; and automatically remembers every detail about each contact and activity. If you're using another planning or contact program, you can switch to Act! for only $89! Call for details about the Competitive Trade-up offer.

Contact Software ✪
4970 Act! For The Mac ..... $258.
5592 Act! Competitive Trade-up ..... $89.

Hayes for the Mac

HayesConnect-Network serial device sharing software allows any serial device to be shared over a network from a server. SmartCom II V.3.3 – the most reliable easy-to-use Mac communication software. Ask about the $40 manufacturer's rebate offer!

Hayes Microcomputer Products
1628 SmartCom II V.3.3 ..... $83.
4314 Hayes Connect ..... $74.

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Circle 209 on reader service card

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$3495
11x17 - 400 d.p.i.

Microtek II XE
$1159
1200 d.p.i. - w/Photoshop

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Mac IIsi - 5/80	1895
Extended Keyboard	159
Mac Quadra 700 - 4 meg	3550
Mac Quadra 700 - 4/120	3959
Mac Quadra 700 - 4/210	4195
Mac Quadra 950 - 8 meg	Call
Mac Quadra 950 - 8/210	Call
Mac Quadra 950 - 8/540	Call
Mac Powerbook 145 4/40	1995
Mac Powerbook 145 4/80	2450
Mac Powerbook 160 4/40	2289
Mac Powerbook 160 4/80	2495
Mac Powerbook 180	Call
Macintosh VX Systems	Call

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15" SVGA Color Display	595
17" Autoscan SVGA Color	995
21" Autoscan SVGA Color	1795
21" Autoscan 80 KHz Color	2495
Radius	
19" Precision Color Display	**2290**
21" Color Display	2795
Color Pivot	**1249**
Color Pivot Interface II, LC, IIsi, SE, SE/30	**515**
Pivot Display for Built-In Video	799
Two Page Display 19"	959
Two Page Display 21"	1230
Two Page Display Interface SE, SE/30, II, IIsi	399
Precision 8 Interface	515
Precision 24x	1689
Precision 8x	779
Rocket Accelerator 25 I	**1299**
Rocket Accelerator 33 Mhz w/mathco	**1999**
Apple	
Apple 13" Highres	649
Seiko	
Seiko CM-1445	569
Sony	
Sony 14" Trinitron	609
SuperMac	
Platinum 19" Display	964
Platinum Two Page Display	1175
Super Match 19" Color	1929
Super Match 21" Two Page Color Display	2839
Super Match 17" Trinitron	1069
Supermac Thunder Storm Pro	2795
Shamrock 14" Color Monitor	399
Dual Mode Trinitron 19"	2459

MONITORS and CARDS (cont.)

Thunder/8	1139
Thunder/24	2295
Spectrum 8.24 PDQ	839
Spectrum 24 PDQ+	1539
Magnavox	
14" Color Monitor	499

DRIVES

	Ext.	Int.
Quantum 105 Pro	469	369
Quantum 210 Pro	835	710
Quantum 240 Pro	909	789
Maxtor 120	489	369
Maxtor 213	729	609
Maxtor 340	1229	1099
Maxtor 180 meg	1800	1679
Seagate 1.2 gigabyte	2269	2149
Syquest 44MB	499	
Syquest 88MB	859	
Internal Drive Kit		29
Syquest 44MB cartridge		69
Road Runner 80 meg for Powerbook		369
Fujitsu 425 meg 5 year warranty		1200

PRINTERS

TI Turbo PS35	1495
Microtek TrueLaser	**1059**
TI Microlaser PS35	1319
TI Microlaser PS17	1209
QMS PS410	**1475**
NEC Model 95	1389
Apple Stylewriter	340
Apple Laserwriter IIf	2499
Apple Laserwriter IIg	3279
HP Deskwriter	389
HP Deskwriter Color	**639**
HP IIp for Mac	1539
HP IIIp for Mac	1749
HP IV for Mac	1995
HP IIIsi for Mac	4639
HP Deskwriter Ink Cartridge	18
Appletalk Connectors	25
HP Deskwriter 550C	759
Newgen Turbo PS 400P (400x400 dpi)	1695
Newgen Turbo PS 880B (800x800 dpi)	3195
Newgen Turbo PS 440B (400 dpi 11x17)	3495
Newgen Turbo PS 660B (600x600 dpi 11x17)	3895
Color Printers	
NEC PS 40	4395

SCANNERS

Logitech ScanMan 32	279
Microtek II	859
Microtek II XE (1200 dpi) w/Photoshop	**1159**
Microtek 1850s Slide Scanner	**1395**
Umax UC-630 w/Photoshop	1129
Caere Typist	429

SOFTWARE

Microsoft Word	28
Microsoft Excell	30
Aldus Pagemaker	49
Calera Wordscan	9
Adobe Photoshop 2.0	51
Quark Express 3.0	57
Caere Omnipage	49

MODEMS

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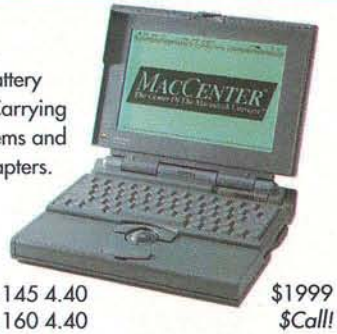

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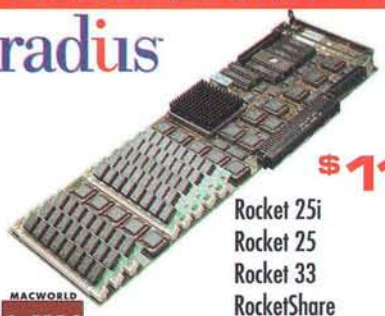

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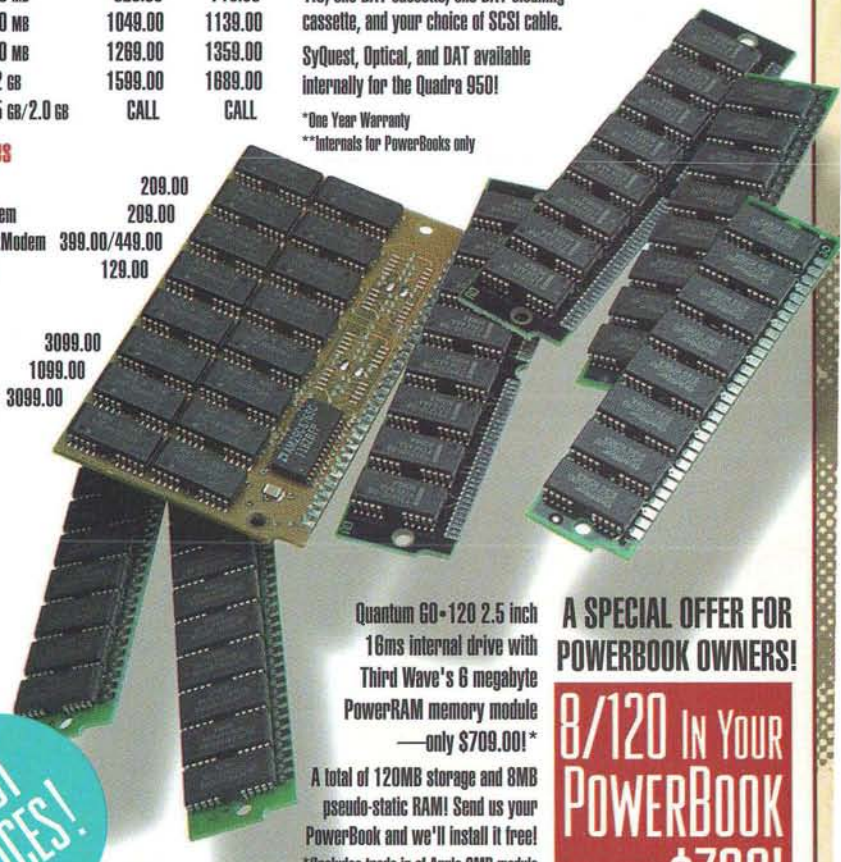

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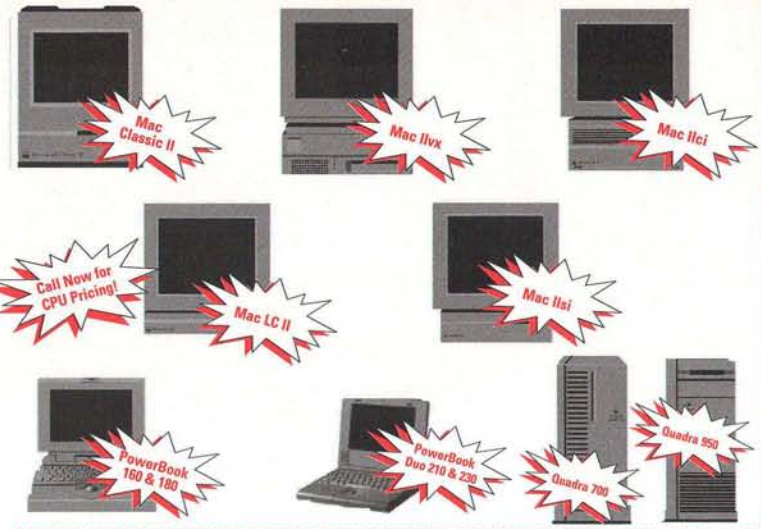

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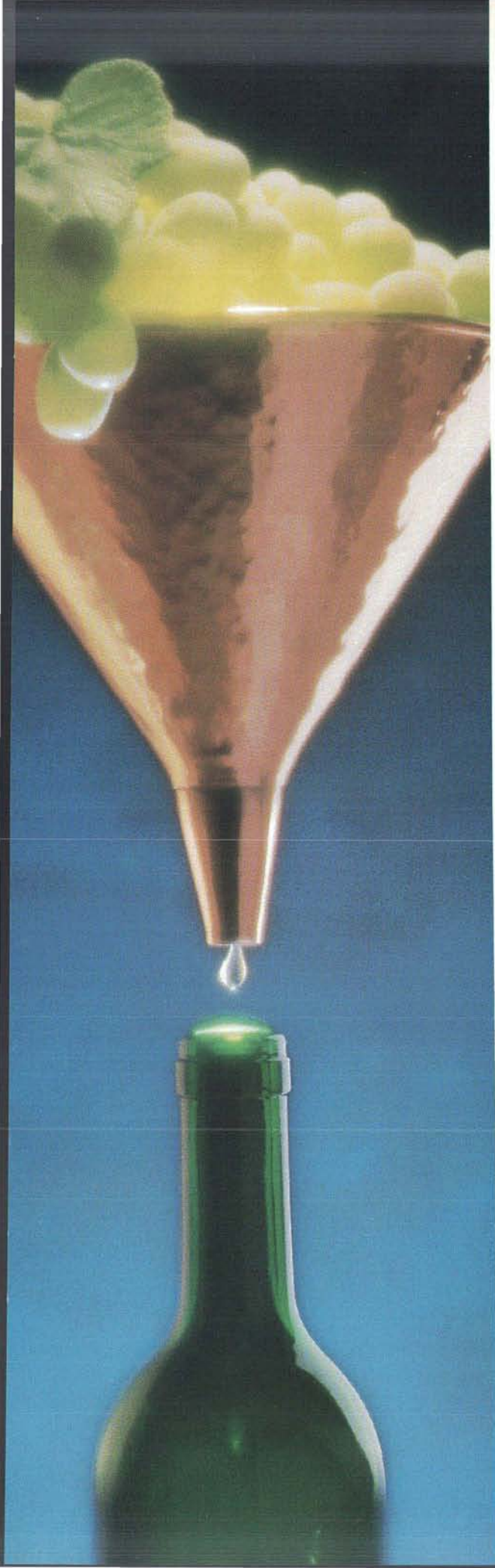

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What are *SPE Options*? These are programs that run on the DataPress to add features like: disk mirroring, super volumes, RAID, encryption, and continuous off-line storage of removable magnetic media.

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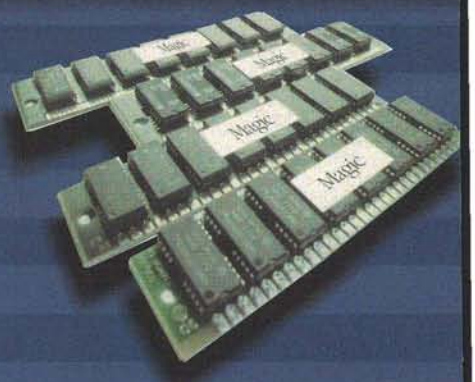

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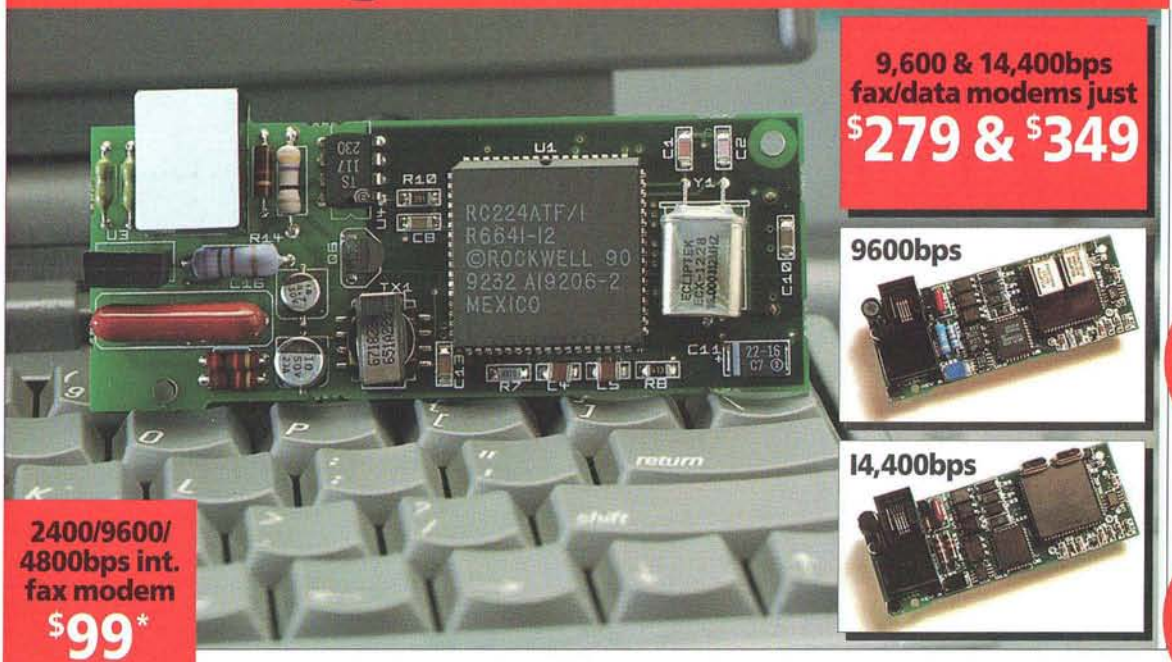

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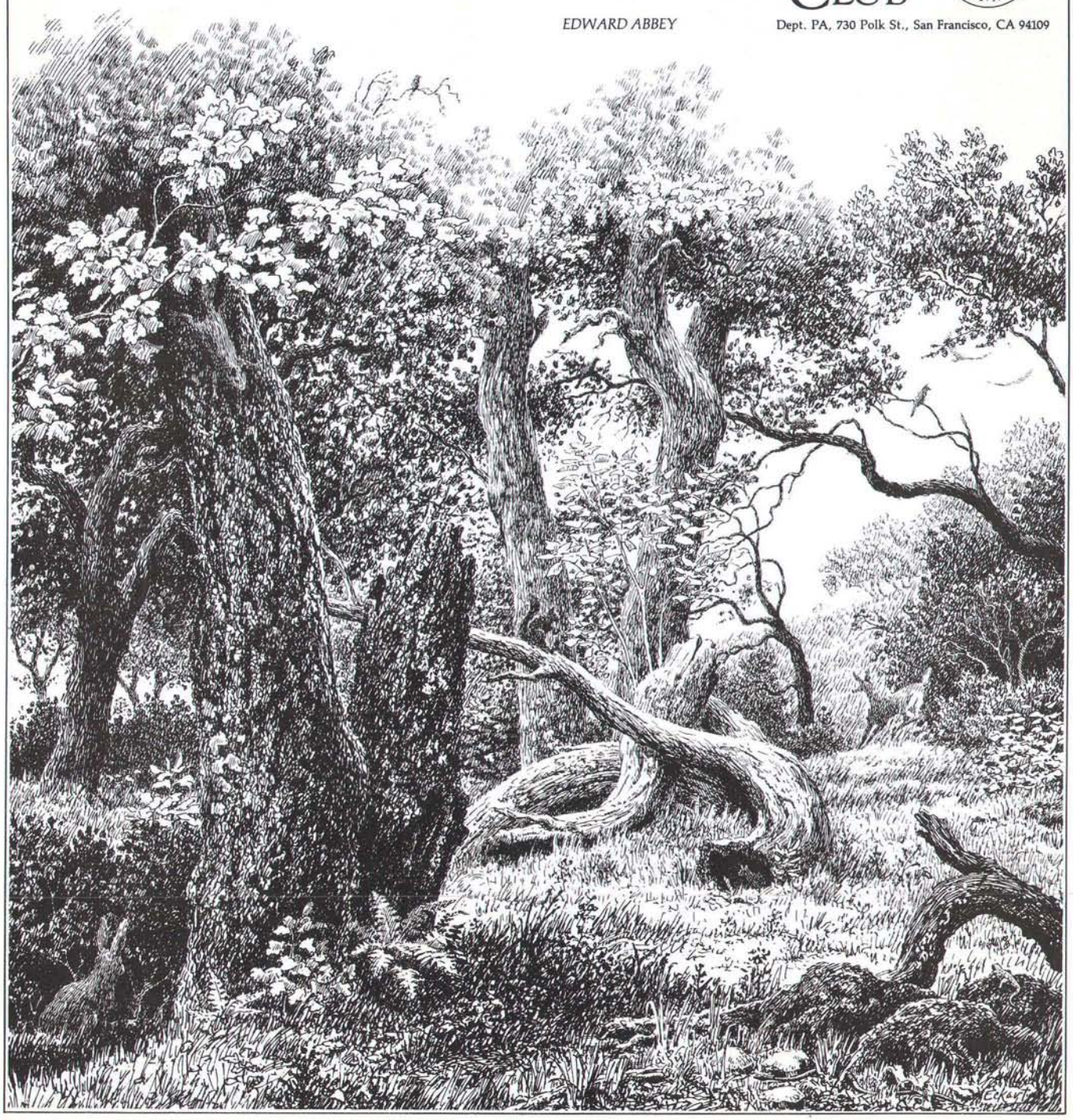

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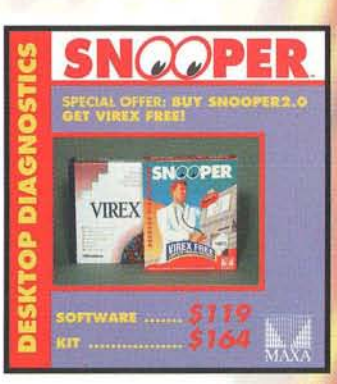

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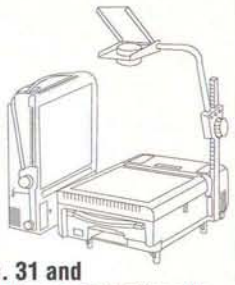

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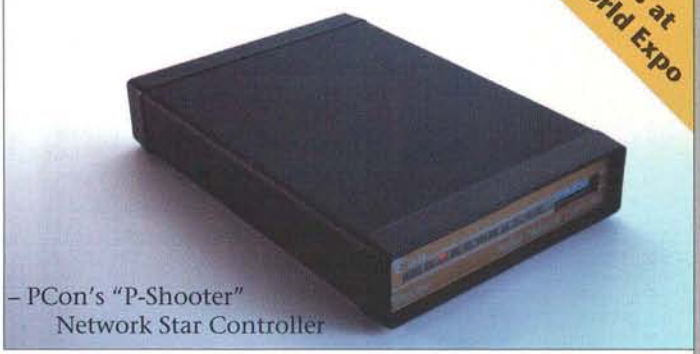

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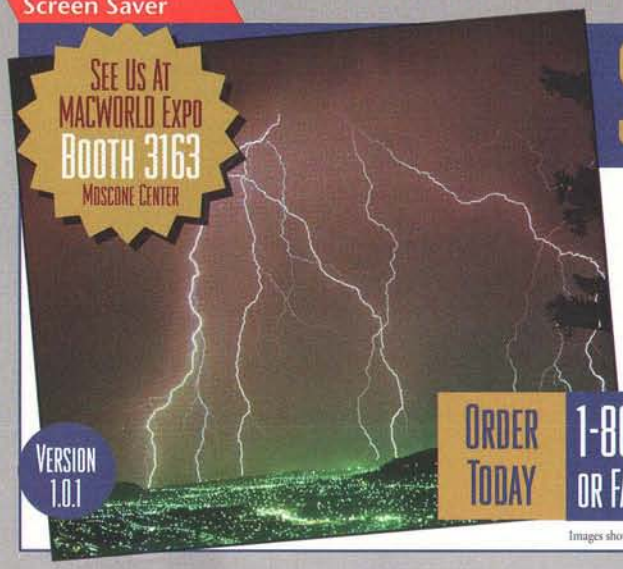

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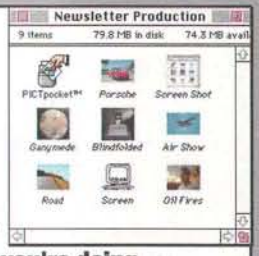

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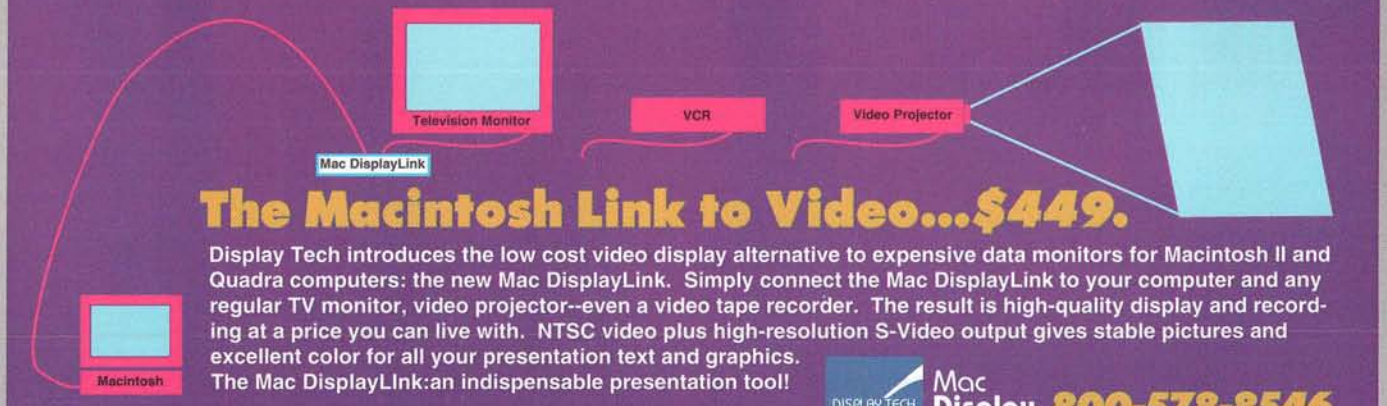

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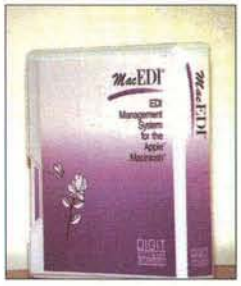

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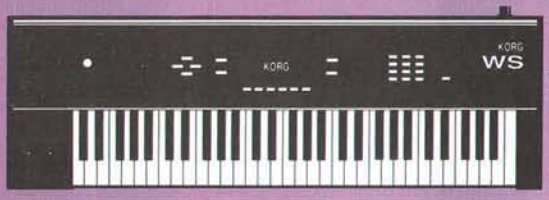

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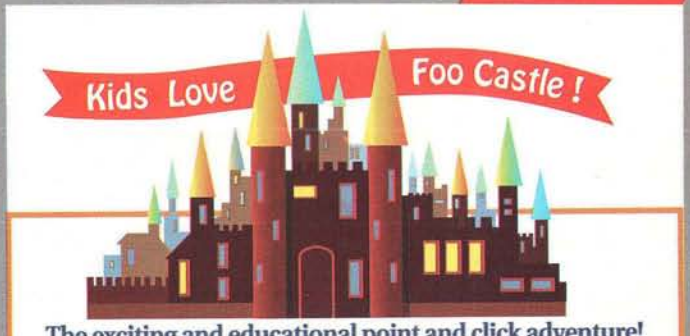

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The Macintosh Herald

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The Incredible *Shrinking* Macintosh

Austin, Texas – Recent Macintosh sightings have revealed smaller units with fewer NuBus slots. Observers note that this trend has become a real problem with the rapidly increasing quantities of NuBus option boards available in the marketplace. A spokesman went on to say that power supplies were also becoming smaller, with less ability to provide power to these sophisticated NuBus

Second Wave Solves the Macintosh Slot Problem

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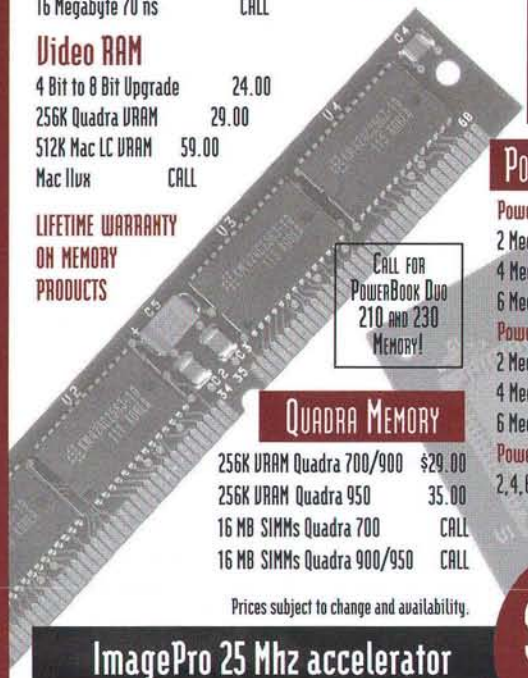

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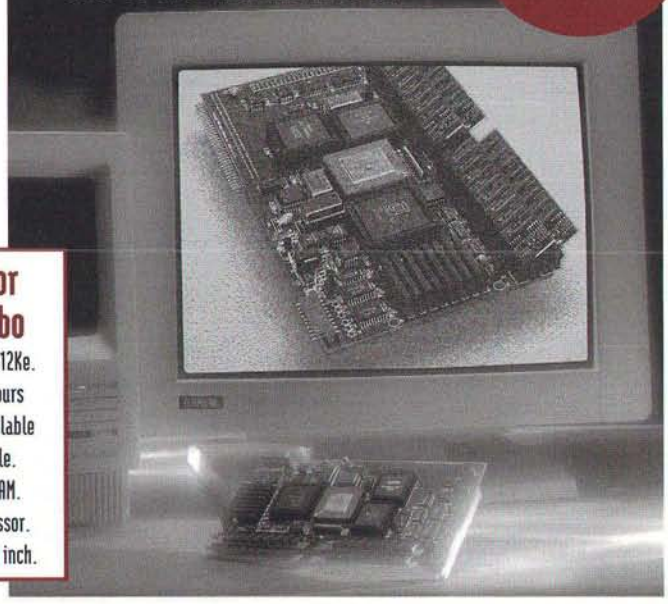

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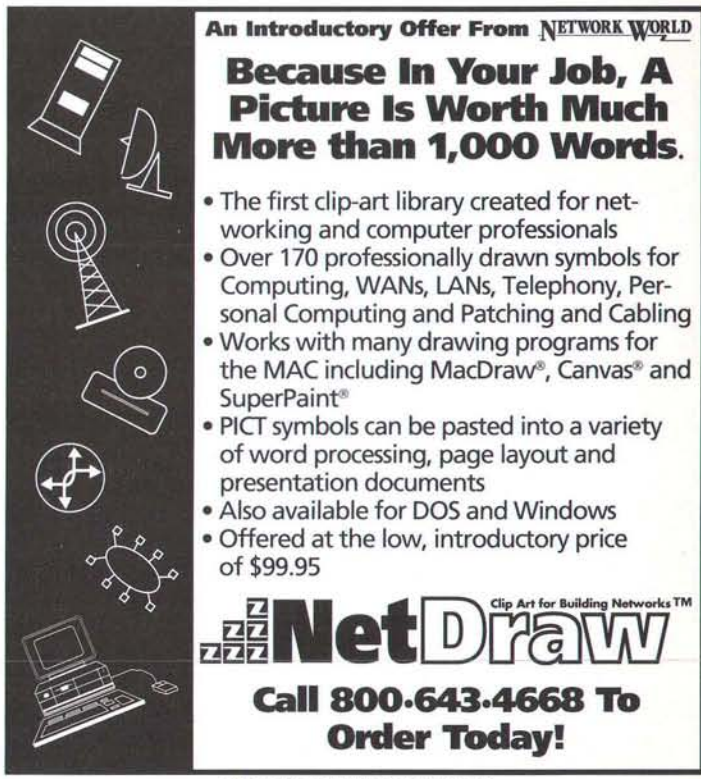

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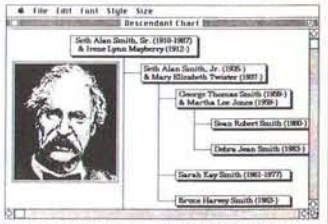

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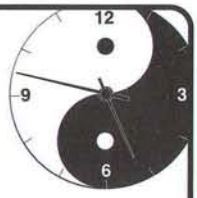

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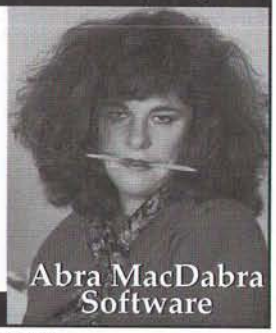

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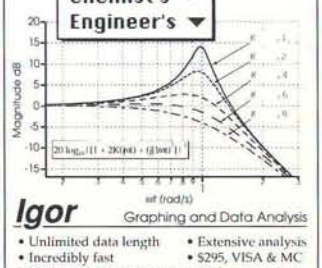

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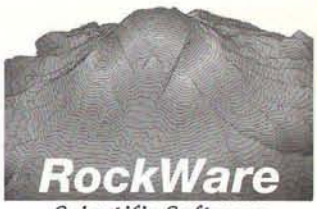

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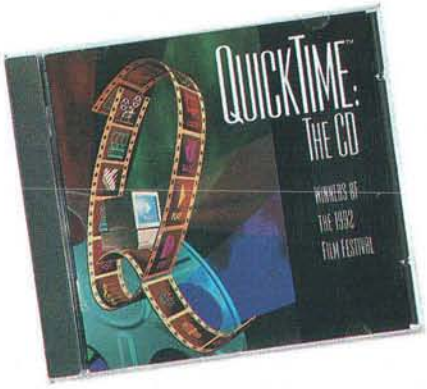

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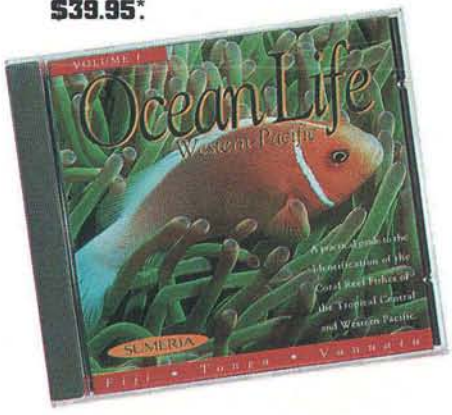

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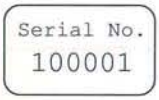

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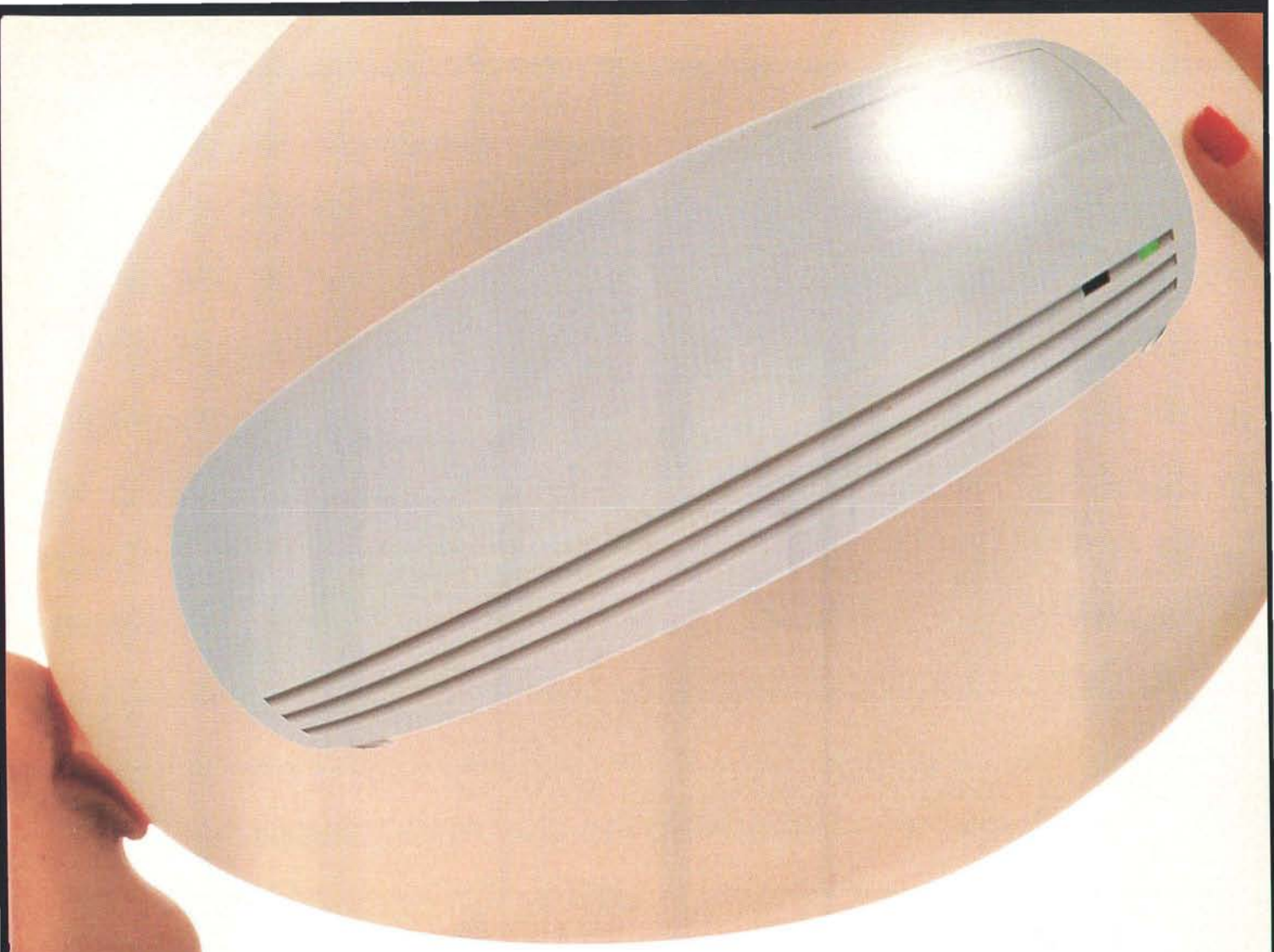

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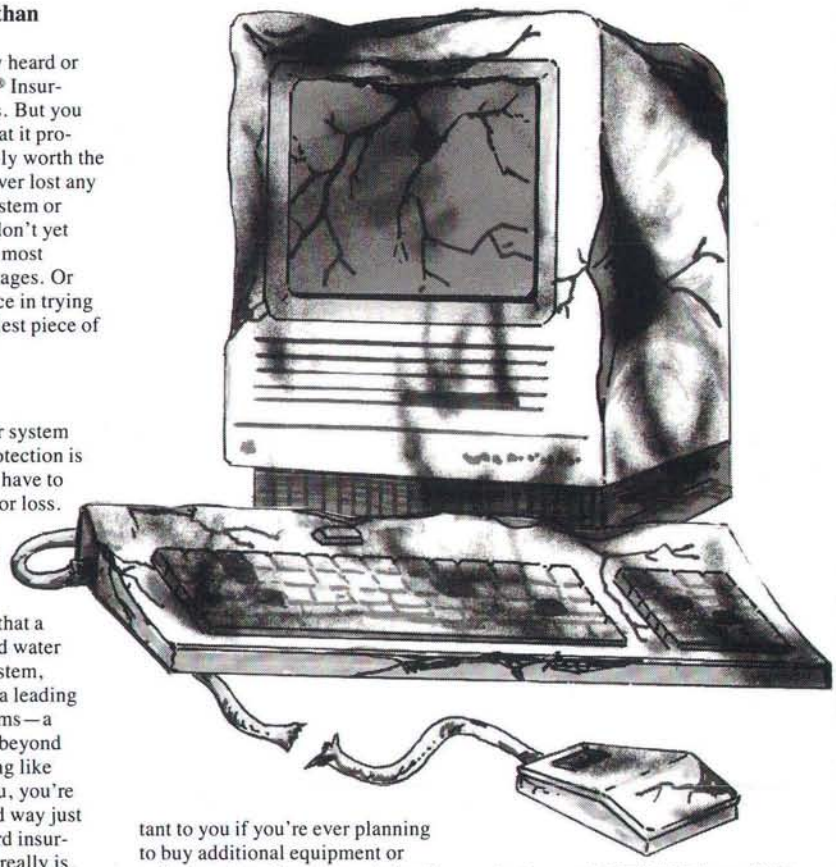

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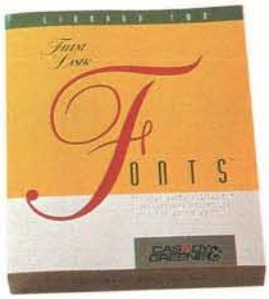

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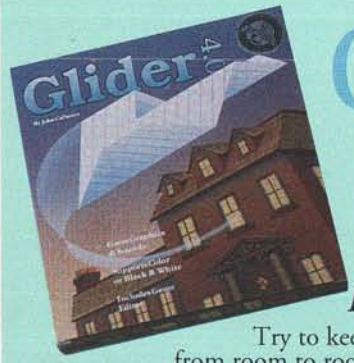

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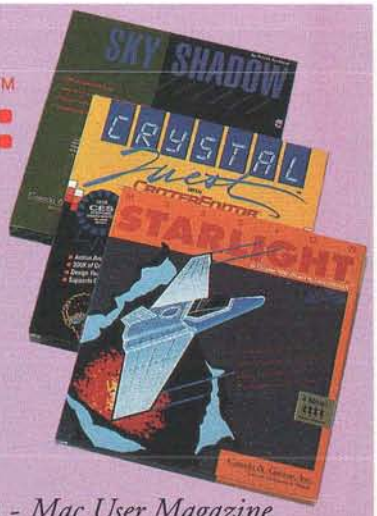

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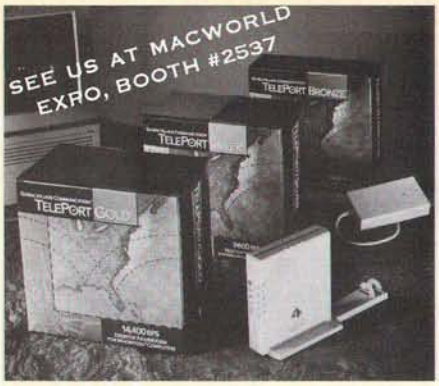

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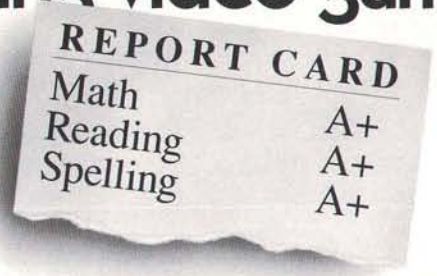
Circle 248 on reader service card

Who would have thought your kids could get scores like this playing video games?



Most video games simply teach kids how to blow up spaceships and attack aliens with lasers. MacKids software gives them more than exciting games to play. It sharpens their skills in such areas as reading, spelling and math with programs like the Preschool Pack, Word Quest and Turbo Math Facts.

So if you want to make learning fun for your kids, give them MacKids. It's the weapon they need to zap low scores.

Nordic Software, Inc.
917 Carlos Drive • Lincoln, NE 68505-2059

Circle 168 on reader service card

Invest in something with growth potential.

America's economic future depends on a motivated, educated work force. At a Boys & Girls Club, kids learn the life skills and job skills they need to grow into productive members of our American economy, as well as our society.

Please make a contribution to the Boys and Girls Clubs. You'll be investing in the growth of America.

BOYS & GIRLS CLUB

SUPPORT THE CLUB THAT BEATS THE STREETS

We ROCKED the Macintosh and Windows™ paint markets with version 1.2. NOW we've loaded up our latest, Fractal Design Painter® version 2.0, with more realism and more surrealism, more control and more out of control. It is like no other application in history. Painter—the natural-media™ paint application.

Painter's brushes now include hot new Scratchboard tools, an airbrush that actually spatters, and the Cubist brush. Cool new effects allow you to apply lighting from single or multiple spot-lights, apply a textured glass distortion, marbleize and more. Type 1 and TrueType™ fonts can be imported.

SO HOT

Fractal Design

Painter® 2.0

SO COOL

All the photo-retouching basics are now built-in: photo-compositing, advanced magic wand selections and color separation.

We've made Painter even easier to use with tear-off tools, snap-to and adjustable grid paper, quick access window controls, visual previews and straight line tools.

Don't wait; contact your local dealer or call Fractal Design Corporation at 408 688-8800.

Fractal Design Painter 2.0.
So Hot, So Cool.

FRACTAL DESIGN CORPORATION

© 1992 Fractal Design Corporation. All rights reserved. Fractal Design Painter is a registered trademark and natural media is a trademark of Fractal Design Corporation. All other trademarks are the property of their respective holders.
Fractal Design Corporation • P.O. BOX 2380 • Aptos, CA 95001 • 408 688-8800

SEE US AT MACWORLD EXPO BOOTH #3478

Circle 190 on reader service card

Join the CD-ROM Revolution!

CD-ROM Drives

All drives come complete and ready to run on Macintosh computers. Your choice of cable. Specify #981 MAC to SCSI or #982 SCSI to SCSI. $50 off the EDUCORP Shareware CD with purchase of any drive.

CD-ROM Drives	Access Time	Buffers	SCSI Settings	Volume Control	Audio Software	SCSI Ports	Terminator	Termination	RCA Jacks	Maximum Voltage	Data Transfer	Reliability MTBF	Warranty	MAC Price	MAC Part#
NEC CDR-37	450ms	64K	Dip Switch	Dial	Music Box DA	1	Not Included	Internal Termination	No	120 Volts	150K/Seconds	10,000	2 Year	$449	1969
NEC CDR-74	280ms	64K	Dip Switch	Dial	Music Box DA	2	Included	Not Terminated	Yes	220 Volts	300K/Seconds	25,000	2 Year	$639	1970
CD Tech CD-T3301*	325ms	64K	Push Button	Dial	CD Remote DA	2	Not Included	Not Terminated	Yes	250 Volts	150K/Seconds	50,000	2 Year	$579	1981
Toshiba XM-3301**	325ms	64K	Dial	Dial	Play CD Stack	2	Included	Not Terminated	Yes	230 Volts	150K/Seconds	25,000	1 Year	$599	1937
Texel DM5024	265ms	64K	Dial	Dial	Music Box DA	2	Not Included	Not Terminated	Yes	240 Volts	300K/Seconds	25,000	1 Year	$579	1815

2 FREE CDs- America Alive and Multimedia HANDisc * 1 FREE CD- AGFA Type (Includes 1 font: Garth Graphic)

CD-ROM Drive Bundles

Get the new, *FAST* Texel CD-ROM Drive with 8 CDs, speakers and headphones $699

Includes drive, Labtec speakers with A/C adapter, stereo headphones, cable, driver software, power supply and 8 titles: Color It! • Desert Storm • Multimedia Encyclopedia • Orchestra • Publish It! • Sherlock Holmes Consulting Detective I • World Atlas • EDUCORP CD Sampler . #D1815

Award winning CD Tech T3301 Porta-Drive, 11 CDs, speakers, headphones $699!

Includes drive, Labtec speakers with A/C adapter, stereo headphones, cable, driver software, power supply and World Atlas • Multimedia Encyclopedia • Publish It! • Desert Storm • Cosmic Osmo • Beethoven's String Quartet #14 • Color It! • EDUCORP CD Sampler • Boston Expo CD • PLUS coupons for 2 FREE multimedia titles: Multimedia HANDisc & America Alive. Just $699 (retail value $2399) #D1981

NEC Drive Bundles

Bundles include an NEC CD-ROM Drive, external amplified stereo speakers, batteries, driver software, cables and up to 11 CDs for as low as $399!

NEC Multimedia Gallery $799

Includes the NEC CDR-74 CD-ROM drive with 7 CD-ROM titles: • Grolier Multimedia Encyclopedia • Just Grandma and Me • Great Wonders of the World • Sherlock Holmes Consult. Detective I• U.S. Atlas • Color It! • EDUCORP CD Sampler • Headphones You pay $799! (value of $1860) #M1970

NEC CD Express $399

Includes the NEC CDR-25 CD-ROM drive with 11 CD-ROM titles: • Publish It! • World Atlas • Lucasfilm Favorites • Total Baseball • Interactive Storytime • The Family Doctor • Great Cities of the World v.2 • Aesop's Fables • Manhole • Best of the Bureau • EDUCORP CD Sampler You pay only $399! #C1964

Create Your Own Bundle

"You asked for it, you got it"

When you purchase *ANY* CD-ROM drive from EDUCORP, you now have the option of creating your *own* CD-ROM drive bundle!

Start your CD-ROM library with the titles you want. Here's 29 titles on a variety of subjects for you to chose from.

Choose from 29 CD titles

- Pick any 3 titles listed below for only $89.95 (code CB3)
- 5 for $149.95 (code CB5)
- 8 for $199.95 (code CB8)

#	CD-ROM Title	Retail Value
B1.	World Atlas	$79.95
B2.	Multimedia Encyclopedia	395.00
B3.	Time Table of History	129.00
B4.	Desert Storm	39.99
B5.	Cosmic Osmo	59.95
B6.	Beethoven's Quartet #14	66.00
B7.	Multimedia World Fact Book	99.00
B8.	US History	395.00
B9.	The Orient	49.95
B10.	Sherlock Holmes Consult.Det I.	69.95
B11.	Environmental Data Disc	189.95
B12.	Economic Data Disc	189.95
B13.	US Atlas	79.95
B14.	Lucas Game Pack	(bundle only)
B15.	Color It!	299.95
B16.	Publish It!	199.95
B17.	SportsROM	69.95
B18.	FM Waves Artware	149.00
B19.	DTPro	149.00
B20.	Manhole	34.95
B21.	Scenic & Nature III	69.95
B22.	Scenic and Architecture	69.95
B23.	600 Days to Cocos Island	69.95
B24.	Boston Expo CD	15.00
B25.	Funny: A movie in QuickTime	39.99
B26.	The Orchestra	79.98
B27.	Sports Illustrated- Almanac	59.95
B28.	Word Tales	49.99
B29.	The View from Earth	79.95

More CD-ROM drives and optional bundles available, call.

Over 275 CD-ROM titles in stock

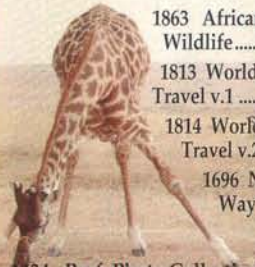
We'll meet or beat any advertised price on CD-ROM products

Stock Photos

* Royalty Free!

Each CD has 100 (most have 200) digital stock photos saved in 24-bit color.

1735 People in Business* $129.95
1736 People at Leisure* 129.95
1686 Kids* 129.95



1863 African Wildlife 129.95
1813 World Travel v.1 ..... 129.95
1814 World Travel v.2 .. 129.95
1696 Nature's Way* ... 79.95

1334 Prof. Photo Collection* 69.95
1581 Int'l Graphics Library 199.00
1698 Donatelli Lingerie v.3* 99.00
1822 Ocean Magic 89.95
1625 Aquatic Art* 99.95
1585 Ocean Imagery* 69.95
1865 Antique Toys* 49.95
1595 Swimsuit v.1* $199.00
1788 Swimsuit v.2 ..... $199.00

Published by Gazelle Technologies, Inc.

Movie Clips

1677 ClipTime v.1....169.95
Add a new dimension to your applications with 250 movie clips.

1919 ClipTime v.2....199.00

American Media. 350 movie clips, photos, sounds, stingers.
Published by Alpha Technologies, Inc.

1701 Digital VideoLibrary 129.95

Get their attention with over 180 diverse quality video clips.
Published by Gazelle Technologies, Inc.

1659 WraptureReels One $179.95

Broadcast quality digital video w/animated textures and looping video clips. 550 MB of material.
Published by Form & Function

Editable EPS

Shatter previous EPS, PICT and TIFF design restrictions with professional art lettering, images, cartoons, and backgrounds from these 4 CDs. All the graphics are editable, stretchable, rotatable, and infinitely resizable. Most are available in EPS, Illustrator and Freehand formats.

1857 BackIMPACT! Pro ..$79.95
150 color & b/w EPS images, backgrounds.

1856 SlickART Plus $99.95
Art lettering, images and backgrounds in Marble, Chrome and Neon.
Published by Art Sector One

1819 Funny Business ..$129.95
Boost readership and increase sales with world class business humor created by internationally acclaimed cartoonists.

1680 GraphTec Graphic Designs $49.95
450+ EPS images on a variety of subjects in color & b/w.
Published by Gazelle Technologies, Inc.

1653 Wraptures One $95
Imagine over 120 seamless tileable textures at your fingertips! Map to 3D objects, or tile to create multimedia and presentation backgrounds. From shrubbery to stars, sunrises to a school of piranha. Saved in PICT and MacRender-Man optimized. Browser utility.

1990 Wraptures Two$95
NEW! 130+ more textures.
Published by Form & Function

2078 Animal Alphabet.....$59.95

Colorfully animated, this engaging program is designed to help young children learn letters and words. Each letter is represented by an animal. Children can select an animation, QuickTime video, or narrated sentence based on the chosen letter.
Published by REMedia

1924 ABC Songbook $29.95
Sing along with Ramblin' Rico as you learn your ABC's. Entertaining from A to Z as you hear a story related to each letter of the alphabet. Rockin' tunes and funny stories.
Published by Gazelle Technologies, Inc.

Marble background from #1913 PhotoDisc v.3 Full Page Backgrounds $299.95

Circle 157 on reader service card

CD-ROM Showcase

We'll meet or beat any advertised price on CD-ROM products!

1405 7th Wonder.....$59.95

Increase your productivity with this unbelievable collection of essential tools and utilities. Over 100 megs of the most up-to-date System 7-specific public domain/Shareware available today!

2067 A Thousand Fonts.....$39.95

A huge collection of fonts.Everything from Klingon to Hebrew, and from swirly letters to traditional typefaces. Fonts formats include TrueType, Type 1, Type 3, and Screen fonts.

Published by Gazelle Technologies, Inc.

2032 Total Distortion.....$69.95

NEW from the co-developer of Spaceship Warlock-A totally insane multimedia experience! You are an adventurous music video producer. Travel to the planes of existence to the Plane of Distortion in search of fresh material for your music videos. You'll find a detailed 3D world of sound and animation. Meet a crew of rock heads, visit strange locations, and rock out to wild 3D animation, psychedelic visions, and mad metal video!

Published by Pop Rocket

2068 The Journeyman Project.....$79.95

You walk hesitantly down the poorly lit corridor. "This could be the end of me," you think, "it could all end right here, and humanity would suffer for a 1,000 lifetimes because of my failure." You are faced with a weighty decision: risk your life in defense of all that man has achieved in the past several 100 years, or turn safely back to a future marred in ways that only you will ever know.

You turn, and suddenly you are caught frozen in the steely gaze of a 7' tall gleaming alloy beast. And you are standing in its way!

An interactive future awaits you.

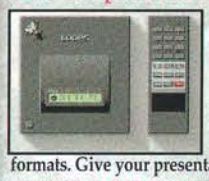
Published by Presto Studios

2047 Putt-Putt Joins the Parade.....$49.95

Wax your car and buff your bumpers — it's time for the Annual CarTown Pet Parade! Help Putt-Putt tackle the local car wash, rescue a lost puppy, put out a fire and more. All this before he takes his place in the parade! Over 30 different locations for your child to explore, along with captivating activities and logic puzzles. 100s of secret Click-Points explode with sound/animation. Designed to challenge 3-7 year old minds. Includes a handbook filled with activities.

Published by Humongous Entertainment

2079 Loops: Music for Multimedia..$79.95



100 original music tracks. From up-tempo tracks for advertising and presentations to sophisticated 'soundscapes' for architectural fly-throughs. Each track is supplied in three formats. Give your presentation the creative edge.

2080 FaceLift Fonts v.1.....$99.95

Give your presentation a facelift! Why spoil your screen and video presentations with nasty, jaggy screen fonts when you can use FACELIFT anti-aliased screen fonts. They're smooth and they work just like regular fonts. Perfect with all presentation packages.

FACELIFT

Published by REMedia

2084 The Iron Helix.....$69.95

The CD-ROM you have been waiting for! A 3D virtual reality style adventure game. Marked by seamless motion through a photo-realistic 3D environment, The Iron Helix is more like a movie than a game. Unlike any other CD-ROM, this fast paced 3D action experience is this years' hottest science fiction thriller!

Published by Drew Pictures

1762 SpaceTime & Art.....$149.95

An exploration of discovery into outer space. QuickTime movies and animations illustrate some recent theories of creation in the universe. You'll also find original space images in 24-bit color, a database of astronomy organizations, illustrated reference stacks and graphic tutorials.

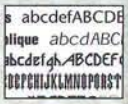
2049 Font Pro v.1: The Essentials..$59.95

125 fonts with complete character sets including international characters. All the fonts are in TrueType and Type One PostScript formats and are fully usable. Contains all the popular styles. Perfect for the graphic designer, or anyone who loves fonts!

Published by Wayzata Technology, Inc.

1300 EDUCORP Shareware 7.0 2-CD Set.....$199.00

From artists to zoologists, you'll find something for everyone! This 2-disc set is loaded with the best public domain & Shareware software available. Over 1 gigabyte. You'll find education, business, graphics, desk accessories, utilities, sounds, games and much more! You'll also get an easy-to-use HyperCard Browser. $50 off with CD-ROM drive purchase from EDUCORP.



Published by EDUCORP

1909 So You Want to be a Rock and Roll Star v.1.....$79.95

Perform in 6 Rock and Roll classics - *(Sitting on) The Dock of the Bay, Stand by Me, Twist and Shout, Crazy, Runaway,* and *In the Midnight Hour.* Each song is accompanied by its own full-length animation. You can delete the singer, guitar, or keyboard player from both the animation and the soundtrack, allowing you to sing or play along yourself! Dynamic music sheets let you click on each measure, so you can hear how each instrument should sound. Also included are in-depth analysis lessons, QuickTime Rockumentaries, and on-screen teachers.

Published by Interactive Records

2069 QuickLaffs v.1.....$79.95

See the classics on your computer! The QuickLaffs Series of CD-ROM features QuickTime movies of classic films starring Charlie Chaplin, Buster Keaton, W.C. Fields and many others. On this volume you'll see *The Tramp,* and *Twenty Minutes of Love* with Charlie Chaplin, and *Love, Speed and Thrills* w/the Keystone Cops. Volume 2 coming soon.

2071 QuickToons v.1 $79.95

This series features QuickTime movies of classic cartoons like *Bugs Bunny, Superman, Betty Boop,* and others.

Published by Gazelle Technologies, Inc.

1786 Boris Vallejo....$199.00

200 incredible fantasy art pictures in 24-bit color.

1787 LaFemme Venus.$99.95

Featuring samples from *The International Salon of Photographic Art 'Venus Studies And Portraits'.*

1327 ExoticaROM 3.0.....$199.00

Olivia is one of the foremost artists of our time. Here's 200 extraordinary exotic pieces, a color browser, and a QuickTime interview with Olivia.

Published by Gazelle Technologies, Inc.

FREE Catalog!

If you don't see the CD-ROM title you want in this ad, chances are we have it! EDUCORP stocks the largest selection. Call for your free catalog. (Foreign customers send $4 postage & handling).

Your CD-ROM Specialist

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Best-Sellers

FEBRUARY 1993

Business Software

Months on chart	Last month	This month		
15	3	1	**Microsoft Office**	*Microsoft Corporation*
84	1	2	**Microsoft Excel**	*Microsoft Corporation*
93	2	3	**Microsoft Word**	*Microsoft Corporation*
45	4	4	**FileMaker Pro**	*Claris Corporation*
7	11	5	**ClarisWorks**	*Claris Corporation*
14	5	6	**MacDraw Pro**	*Claris Corporation*
31	9	7	**Quicken**	*Intuit*
70	10	8	**Microsoft Works**	*Microsoft Corporation*
45	7	9	**WordPerfect for the Macintosh**	*WordPerfect Corporation*
68	6	10	**MacDraw II**	*Claris Corporation*
8	14	11	**1-2-3 for the Macintosh**	*Lotus Development*
80	13	12	**Aldus PageMaker**	*Aldus Corporation*
33	—	13	**QuarkXPress**	*Quark*
23	12	14	**MacProject**	*Claris Corporation*
69	8	15	**MacWrite II**	*Claris Corporation*

Education Software

Months on chart	Last month	This month		
59	4	1	**Reader Rabbit**	*The Learning Company*
4	—	2	**The Playroom**	*Brøderbund Software*
69	—	3	**Math Blaster**	*Davidson & Associates*
1	—	4	**The Oregon Trail**	*MECC*
29	—	5	**Where in the USA Is Carmen Sandiego?**	*Brøderbund Software*

Entertainment Software

Months on chart	Last month	This month		
32	—	1	**Tetris**	*Spectrum HoloByte*
58	1	2	**Microsoft Flight Simulator**	*Microsoft Corporation*
19	—	3	**Beyond Dark Castle**	*Aldus Corporation*
4	—	4	**King's Quest IV**	*Sierra On-Line*
4	5	5	**Space Quest III**	*Sierra On-Line*

Network/Data Communications

Months on chart	Last month	This month		
39	1	1	**PhoneNet**	*Farallon Computing*
62	3	2	**AppleShare**	*Apple Computer*
8	2	3	**AppleTalk Remote Access**	*Apple Computer*
17	4	4	**Netware for Macintosh**	*Novell*
24	5	5	**MacTerminal**	*Apple Computer*

Add-In Boards

Months on chart	Last month	This month		
22	1	1	**Macintosh IIsi NuBus Adapter Card**	*Apple Computer*
26	2	2	**Macintosh Display Card 8•24**	*Apple Computer*
23	4	3	**Pivot**	*Radius*
6	3	4	**Macintosh II FDHD Upgrade**	*Apple Computer*
7	5	5	**Spectrum/8 Series**	*SuperMac*

Utility Software

Months on chart	Last month	This month		
21	2	1	**After Dark**	*Berkeley Systems*
27	4	2	**Norton Utilities for Macintosh**	*Symantec Corporation*
32	1	3	**SAM**	*Symantec Corporation*
11	3	4	**More After Dark**	*Berkeley Systems*
20	—	5	**SUM II**	*Symantec Corporation*

The AmCoEx Index of Used Mac Prices

Machine/RAM/ Hard Drive	Average Sale Price	Monthly Change
Mac SE/2MB/20MB	$675	–$100
Mac Portable/1MB/40MB	$600	$0
PowerBook 100/4MB/40MB	$775	+$25
PowerBook 140/4MB/40MB	$1350	–$50
Mac Classic/2MB/40MB	$600	–$100
Mac SE/30/2MB/40MB	$1500	–$200
Mac LC/2MB/40MB	$800	–$50
Mac II/4MB/40MB	$1400	+$50
Mac IIsi/3MB/40MB	$1275	–$200
Mac IIcx/4MB/80MB	$1775	–$25
Mac IIci/4MB/80MB	$2100	–$200
Mac IIfx/4MB/80MB	$2900	–$100
Apple 12-inch B&W display/board	$150	–$50
Apple 13-inch RGB display/board	$475	–$50
LaserWriter Plus	$850	–$100
LaserWriter IINT	$1450	–$50

Index provided by the American Computer Exchange of Atlanta, Georgia (800/786-0717). It reflects sales during week of November 20. Configurations include keyboard and exclude monitor and display board for noncompact models.

Source: Exclusive Audits & Surveys research from more than 250 Macintosh retailers and selected mail-order vendors. Covers sales during October 1992.

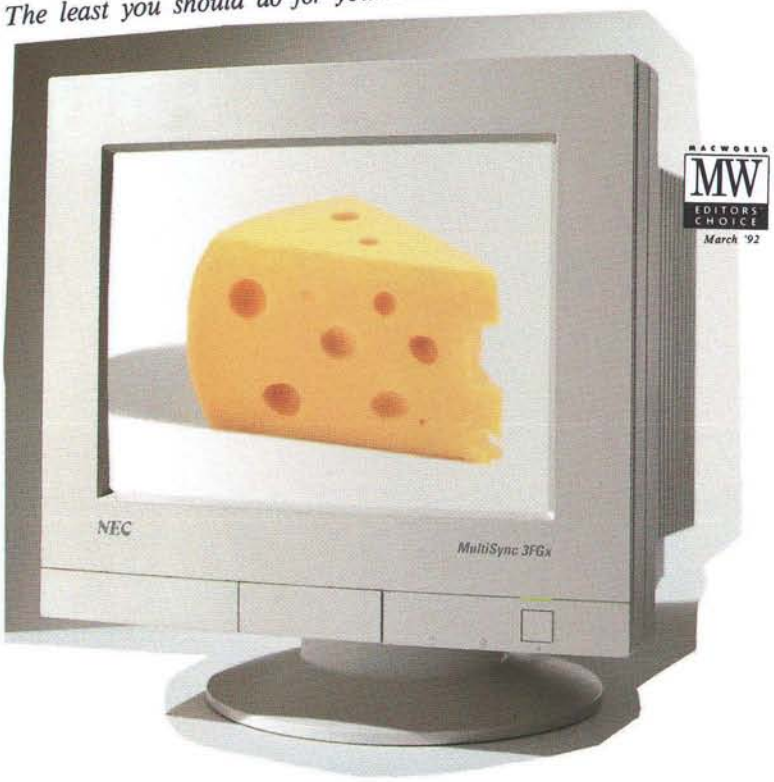
Announcing a better mousetrap.

NEC

SEE US AT MACWORLD EXPO, BOOTH #207

The least you should do for your Mac®

The NEC MultiSync® 3FGx™ monitor.



In 1992, the only monitor to snag the coveted five-mice rating was an NEC monitor: the remarkable MultiSync 4FG. After running it and 13 others through the most rigorous technical evaluation they'd ever used for testing monitors, *MacUser* magazine concluded, "If you're looking for the sharpest display, the NEC MultiSync 4FG should be your top choice."

What more can we say? Glad you asked. First, there's our AccuColor™ Control System, which prompted *MacUser* to make special mention of the "easy color adjustments." AccuColor lets you adjust on-screen colors, so if you're looking for mouse-tail pink, that's what you'll get.

If, however, color control is not a priority for you, you'll be very happy with NEC's MultiSync 3FGx monitor, which shares almost all of the 4FG's award-winning features. Both monitors produce sharp, bright images, crisp graphics and vibrant colors. An Invar shadow mask provides increased brightness without loss of focus. And our high-contrast polished screen improves clarity.

Another big idea—the display area. The large 15″ screen* coupled with FullScan™ capability for edge-to-edge images gives you a considerably larger display area than typical 13″ or 14″ RGB monitors.

How do you make an NEC MultiSync monitor work with your Mac? Just plug it in, using NEC's free FG/Mac cable adapter. It works with the Mac's on-board video, so you won't need an add-in video board.†

Both monitors are compatible with the Mac® II family, Quadra™ series, LC's, PowerBooks™ and PC systems. So you can use just one monitor for both types of platforms. *MacUser* noted the "powerful and versatile controls make switching from a Mac to a PC a snap."

And to make these monitors as user-friendly as possible, we've included ergonomic features such as a tilt/swivel base and up-front user controls. Plus, our Reduced Magnetic Field™ technology meets the strict Swedish MPR II guidelines for magnetic field emissions.

There are lots of reasons for considering an NEC MultiSync monitor for your Mac—the sharp, bright images, the vibrant colors, the large display area, the flexibility, the compatibility—to name five. And the ★★★★★ to name five more.

For more information on our award-winning monitors, call 1-800-NEC-INFO (in Canada: 1-800-343-4418). Or for information via fax, call NEC FastFacts™ at 1-800-366-0476, request #62234.

†For Macintosh 640 x 480 resolution, just attach NEC's FG/Mac cable adapter and plug into: Macintosh IIsi, IIci, LC, LCII, IIvx, IIvi, Quadra™ 700, Quadra 900, Quadra 950, Performa™ 400, Performa 600, PowerBook™ 160, PowerBook 180, and the PowerBook 210 and PowerBook 230 with either the DuoDock™ or MiniDock™ Or with an add-in video card: Macintosh II, IIx, IIcx, IIfx, PowerBook 140, PowerBook 145, and PowerBook 170. Get the FG/Mac adapter free by calling NEC at (312) 622-7427 8:30AM-5PM CST.

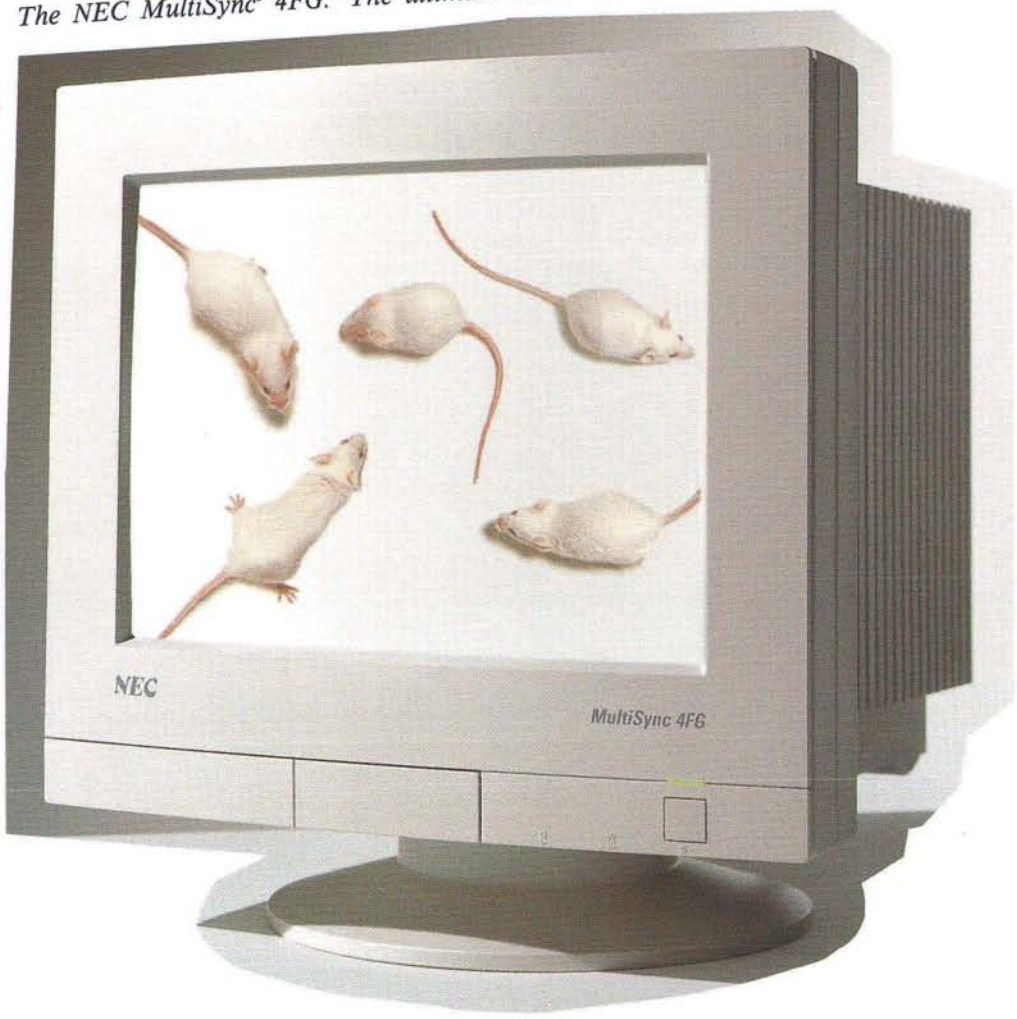
*15" CRT yields 13.8" active display area. All quotes reprinted from MacUser magazine, August 1992. © 1992, Ziff Communications Company. MacUser and 5-mice logo are registered trademarks of Ziff Communications Company. MultiSync is a registered trademark and AccuColor, FastFacts, FG, FullScan, Reduced Magnetic Field and MultiSpin are trademarks of NEC Technologies, Inc. SilentWriter is a registered trademark of NEC Corporation. All other trademarks are the property of their respective owners. © 1992 NEC Technologies, Inc.

Because ⬆ is the way you want to go. NEC

Circle 16 on reader service card

The NEC MultiSync® 4FG.™ The ultimate monitor for your Macintosh.®

At NEC, we've developed *hundreds of computer products expressly for Mac systems: from our highly-acclaimed MultiSync monitors, MultiSpin™ CD-ROM readers and Silentwriter® laser printers, to our Professional Graphics Series, which includes our new 27" MultiSync 3PG data monitor and MultiSync 6PG and 9PG Projection Monitors for images as large as 25 feet.*



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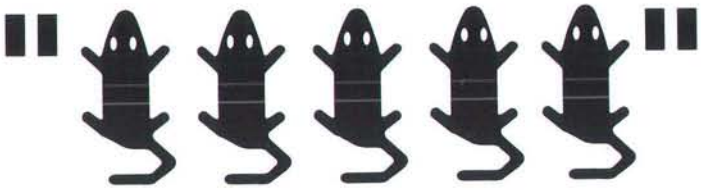

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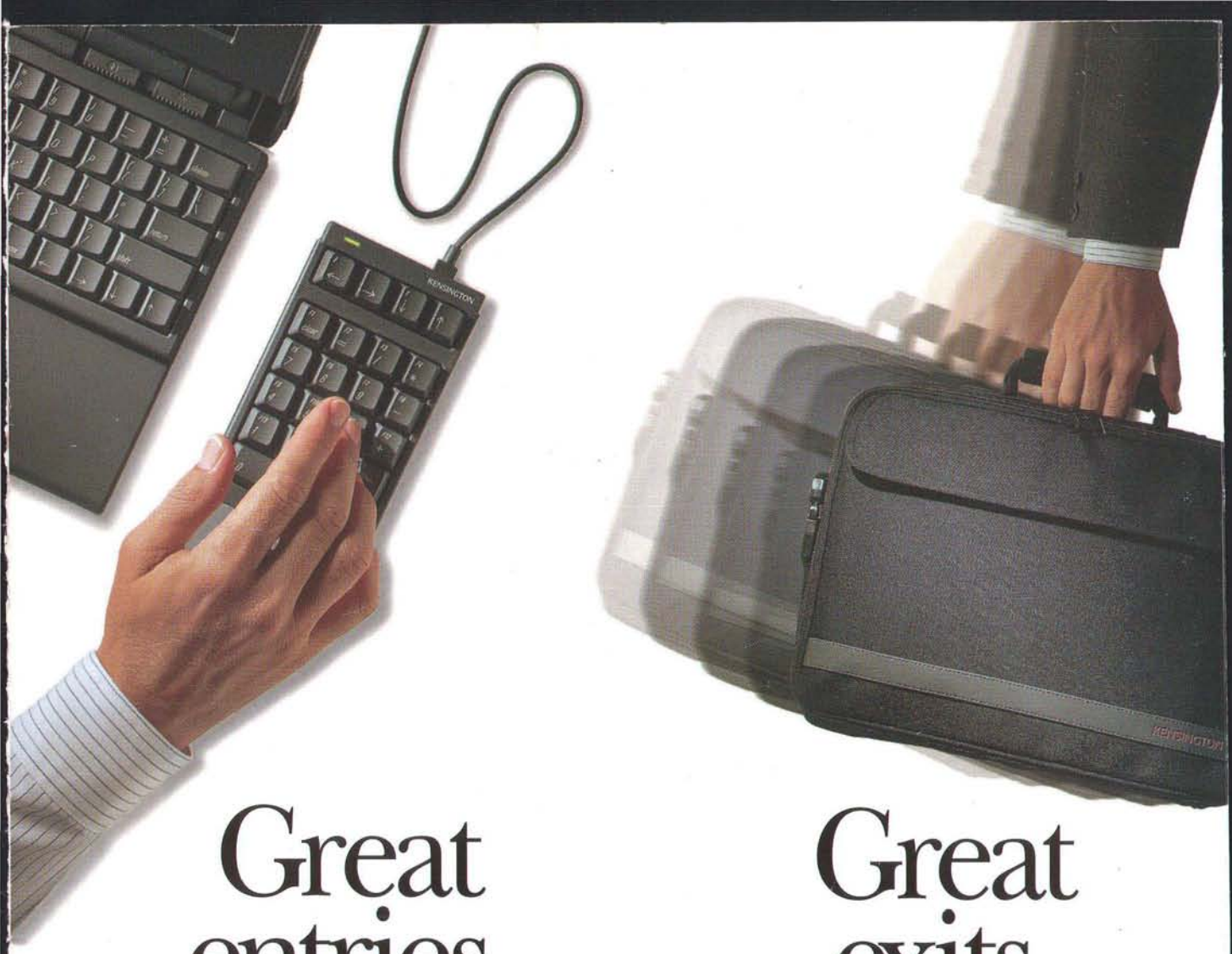
–MacUser Magazine
Aug.'92



Great entries.

Great exits.

Kensington introduces two new products for PowerBook® computers.

Kensington NoteBook KeyPad
Want to add full keyboard performance to your PowerBook? Want to enter numbers fast and accurately?

The Kensington NoteBook KeyPad is the answer.

Features include a calculator-style layout, mathematical function keys and an oversized Enter key. All keys are full-size. We even added the "5 Dot Home Key" for touch users.

What's more, 15 additional Function keys help reduce keystrokes and enable VAX/mainframe communication.

The Kensington NoteBook KeyPad has a small footprint, weighs just under 9 oz., plugs into any ADB port and is System 7 compatible.

Kensington NoteBook Traveler™
Now there's a traveling case designed just for PowerBook computers. It's rugged, yet lightweight. Stylish, yet functional. And it comes in three convenient sizes—the full featured *Executive* version, the ever popular *Deluxe* and the streamlined *Compact.*

All versions include an impact-resistant computer compartment with high density padding, numerous zippered compartments and handy utility pouches.

Our new Executive version features three separate compartments for maximum storage, handy elastic straps for securing accessories, an accordion-style compartment for files and an outside pocket for quick access.

NEW EXECUTIVE CASE

Every case has a durable, water-resistant fabric shell, a removable shoulder strap, reinforced webbing and self-repairing zippers. What's more, our unique easy-carry handle combines the strength of rivet-reinforced nylon with the comfort of foam rubber.

For more information, call 800-535-4242. Outside the US, 415-572-2700. For information by fax, call 800-535-4242 and enter 82.

See us at MacWorld Expo, Booth #1041.

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